ABSTRACT

Bettie Jeanne Smith, THE EFFECT OF SCHOOL CULTURE ON STUDENT ACHIEVEMENT (Under the direction of Dr. Martin Reardon). Department of Educational Leadership, June 2014.

This study examined school culture as identified through NC teachers' responses to questions regarding school leadership's sustained effort to address teachers' concerns about leadership issues, facilities and resources, the use of time in the school, professional development, teacher leadership, community support and involvement, managing student conduct, instructional practices and support, and new teacher support on the 2012 NC Teachers Working Conditions Survey. Teachers responded using a Likert-style scale and were clustered into Leadership Perception Groups (LPGs) that paralleled the Likert scale responses. Quantitative methods were used to determine the significance of association between the LPGs and the 2012 reading and math achievement data for third through eighth grade NC students. Percentage of proficiency was the student achievement measure.

Findings revealed significance in about half of the grade and subject groups. The LPG characterized by negative responses most consistently associated with student achievement in reading and math at all grade levels. Results suggest that the association between negative culture and student achievement is an important area for further study.

The findings from this study suggest three interpretations. First, teachers' perceptions regarding whether their school leadership addresses their concerns is a strong indicator of the culture of the school. Second, teachers' effectiveness is impacted by their administrators' reaction to their concerns. Finally, the concentration of teachers that is satisfied or dissatisfied with their school leadership is associated with student achievement significantly. The implications for cultural leadership are discussed.

THE EFFECT OF SCHOOL CULTURE ON STUDENT ACHIEVEMENT

A Dissertation

Presented to

The Faculty of the Department of Educational Leadership

East Carolina University

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Education

by

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June, 2014

THE EFFECT OF SCHOOL CULTURE ON STUDENT ACHIEVEMENT

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CHAPTER I: INTRODUCTION

Recent federal mandates to raise student achievement in public schools in the United States have spawned an increased focus on the role of the principal as the primary change agent for school improvement. In a 2010 interview, Gail Connelley, the Executive Director of the National Association for Elementary and Secondary Principals, asked Secretary of Education Arne Duncan his view of the role of principals in improving school achievement. He responded that, "nothing is more important" (Connelley, 2010, p. 35).

Historical Trajectory

The recognition of the importance of the principal in the process of continuous improvement in North Carolina Schools over the past ten years provides a backdrop for this study. To ascertain if, and to what degree, a principal is able to effectively implement positive change at the school level, the North Carolina State Board of Education promulgated new principal evaluation methods. On December 7, 2006, the North Carolina State Board of Education approved the *North Carolina Standards for School Executives* (NCSSE, North Carolina Department of Instruction, NCDPI, 2006). These are the professional standards for school administrators through which the administrators might guide their practices and by which the administrators would subsequently be evaluated. The Ad Hoc Committee on School Administration, a committee established by the North Carolina State Board of Education for the purpose of revising standards for principals in North Carolina (Williams, 2010), defined the NCSSE as a guide for reflection and improvement. The standards address all areas of school functions from instructional practices to finances to the culture and climate of the school.

The publication of the NCSSE, redefined the role of principal as manager, and declared the performance of a principal "…a social act. Whether we are discussing instructional leadership, change leadership or leadership as learning, people are always the medium for the leader" (NCDPI, 2006, p. 1).

While the NCSSE (NCDPI, 2006) states the need for school executives to create *systems for change*, to build *powerful relationships that stir passion* and to *create a common shared understanding for the purpose of their work*, data and research are not cited in the document. A careful comparison reveals that the standards loosely reflect Marzano's (2003) *21 Principal Leadership Responsibilities*. Though in a different format, NCSSE addresses all the key aspects of the Balanced Leadership meta-analysis presented by Waters, Marzano and McNulty (2003). In 2008, the North Carolina State Board of Education approved the School Executives' Evaluation Instrument (SEEI), based on the NCSSE and developed by the Mid-continent Research for Education and Learning (NCDPI, 2010) for which Marzano is a principal researcher and author.

Marzano's organization created the evaluation instrument for North Carolina, however, the standards themselves reflect the work of prominent researchers and writers in the field of educational leadership. A review of the text of Standard 3, Cultural Leadership, suggests that the work of Charlotte Danielson, Thomas Sergiovanni, Nel Noddings and the ISLLC (Interstate School Leaders Licensure) Standards influenced the writers of the NCSSE. Danielson (2007), Sergiovanni (2001) and Noddings (2005) all write about the importance of shared beliefs, passion and caring to effective school culture.

Standard 3 of the NCSSE (NCDPI, 2006) asserts that:

> School executives will understand and act on the understanding of the important role a school's culture contributes to the exemplary performance of the school. A school executive must be able to "reculture" the school if needed to align with the school's goals of improving student and adult learning and to infuse the work of the adults and students with passion, meaning and purpose. Cultural leadership implies understanding the school and the people in it each day, how they came to their current state, and how to connect with their traditions in order to move them forward to support the school's efforts to achieve individual and collective goals (p. 4).

The emphasis on a principal's ability to develop and maintain positive school culture will be explored in this study. According to Gewertz (2009), Duncan supported this notion in a speech on June 22, 2009 when he declared that a viable option for turning around low-performing schools was to "revamp the school culture" (p. 2). Similarly, Danielson told Principal Magazine (NAESP, 2012, p. 26) that the school's culture is key to professional learning and that school culture is built on trust. Sergiovanni referred to cultural leadership in his writing and suggested that passion about purpose was essential for leaders to develop a sense of community in their schools (Brandt, 1992). Noddings (2005) work, which focuses on the ethics of caring in schools, seems to mirror the standard 3 language about "understanding the school and the people in it each day, how they came to their current state." The NCSSE and the SEEI address a wide variety of skills, attitudes and dispositions, among them Cultural Leadership, which is designated as Standard Three in the NCSSE (NCDPI, 2010).

Standard 3 identifies the culture of a school as an important contributory factor to the exemplary performance of a school (NCDPI, 2006). Standard 3 also includes the directive to *reculture* a school to improve student learning (NCDPI, 2006, p. 4), and includes words like *passion* and *purpose* to describe the attitudes, values and identity of schools and their respective educational communities. The most recent iteration of the ISLLC Standards (Council of Chief State School Officers, 2008, pp. 14-15), as adopted by the National Policy Board for Educational Administration, mentions school culture in three of the six standards. The standards mention shared vision, culture, school safety, community support, ethics and cultural context.

Studying School Culture

As stated, descriptors for school culture, like *passion* and *purpose*, describe attitudes and beliefs. According to Creswell (2012), survey research is best used to describe attitudes, opinions, behaviors or characteristics of a population. Therefore it is not surprising that many surveys exist for the purpose of measuring school culture. For example, Wagner (2006) described the *School Culture Triage Survey,* developed by Phillips (1996), Phillips and Wagner (2003) and Wagner and Masden-Copas (2002), as a means for assessing and improving school culture. Similarly, Mitchell (2008) used the *School Culture Survey* to correlate school culture and third grade reading and math achievement scores in coastal southeastern Texas. The Character Education Partnership, a national advocacy group committed to fostering effective character education in our nation's schools ("Assessment tools," n.d.), lists over thirty surveys of school culture on its website to help schools gain information about the culture of their schools through surveys of stakeholders. Descriptions of the surveys offer areas of focus, scoring guides

and reliability information. The use of surveys is an effective means of identifying important beliefs and attitudes and, according to Creswell (2012), can be used to follow up with respondents for a number of years after an initial study.

The effect of culture on student achievement has been studied by a number of researchers. Studies by Williams (2011), Mitchell (2008), and Pritchard, Morrow, and Marshall (2005) measured the achievement of students in schools in which study participants identified their culture as positive or effective. The researchers describe positive correlations between student achievement and school culture in their studies, which included surveys, observations, and student writing samples. A study by Nagy (2011) identified the behaviors of the administrators in schools with high achievement using Marzano's (2003) *Principal Leadership Responsibilities* as a framework for evaluation.

McCollum and Yoder (2011) studied the relationship between the culture of a school, relationships with teachers, and the academic aspirations of middle school students, and MacNeil, Prater and Busch (2009) similarly explored the associations between positive school culture, motivated teachers and student achievement. Using surveys, interviews, and questionnaires, the researchers have consistently found correlations between school culture and student achievement.

A Current Model of School Culture

Along with heightened attention to the importance of developing and measuring cultural leadership skills among school administrators is the need for further clarification of the exact definition and attributes of what *good* cultural leadership and school culture looks like within the school setting. Schoen and Teddlie (2008), in a "theoretical

sampling" (p. 130), identified the need for clarity in identifying school culture and its effect on student learning. Their review of the literature found "characteristically ambiguous" (p. 133) definitions of school culture like Deal and Kennedy's "shared beliefs and values" (as cited in Schoen & Teddlie, 2008), and Deal and Peterson's "underground stream of norms, values, beliefs, traditions and rituals that has built up over time as people work together, solve problems and confront challenges" (as cited in Schoen & Teddlie, 2008). A product of Schoen and Teddlie's (2008) work is a four-dimension model (professional orientation, organizational structure, quality of learning environment and student-centered focus) that describes school culture based on a synthesis of the research. The model provides a framework for reflection on the attributes and characteristics of the culture of a school.

NC Teachers Working Conditions Survey

Bi-annually, educators throughout the state of North Carolina are given the opportunity to respond to the North Carolina Teacher Working Conditions Survey (TWCS) and anonymously describe the working conditions in North Carolina schools. The online survey administered by The New Teacher Center, addresses the eight North Carolina Working Conditions Standards (NC WCS) identified by North Carolina as essential for successful schools in the state. The NC WCS focus on (a) time, (b) facilities and resources, (c) community support and involvement, (d) managing student conduct, (e) teacher leadership, (f) school leadership, (g) professional development, and (h) instructional practices and support. These ideas are also addressed in the ISLLC Standards, Danielson's work, Sergiovanni's work, and are topics addressed in most of the school culture surveys listed on the Character Education Partnership website (School

assessments, n.d.). These strong parallels support the use of the NC TWCS to study the effect of school culture on student achievement in North Carolina schools.

In this study, an analysis of Question 7.3 (Q7.3) of the 2012 TWCS will be conducted. Q7.3 asks teacher participants to rate their concerns in nine key areas: (a) leadership issues, (b) facilities and resources, (c) the use of time, (d) professional development, (e) teacher leadership, (f) community support and involvement, (g) managing student conduct, (h) instructional practices and support, and (i) new teacher support. A comparison of teacher responses and student achievement at the school and Local Education Agency (LEA) level will help to determine the associations between school culture and student achievement and may suggest areas of needed focus to improve student learning.

In order to more fully understand the association between school culture and student achievement, as demonstrated by responses to Q7.3 of the 2012 NC TWCS, demographic and descriptor questions were explored. The demographic and context questions used to discern underlying commonalities are:

- How many total years have you been employed as an educator?
- How many total years have you worked in the school where you are now employed?
- Q5.1g The faculty works in a school environment that is safe.
- Q4.1h The community we serve is supportive of this school.
- Q10.6 Overall, my school is a good place to work and learn.

Understanding the levels of experience, either in the profession or in the current school, provides important information for school leaders and may confirm or refute assumptions

regarding response trends for each level of experience. Context descriptor questions Q5.1g, Q4.1h and Q10.6 form an interesting parallel to Maslow's hierarchy of needs. Maslow posits that if physiological needs, safety needs, belongingness needs and esteem needs are met, an individual will move toward self-actualization or the drive to reach his or her full potential (Schott, 1992). While physiological needs are not addressed, the other three needs are central to the descriptor questions. The descriptor questions were chosen and compared with teacher responses in order to observe commonalities that may help explain the culture in their schools and the effect of that culture on student achievement. In the final analysis, only the questions regarding years of experience in the profession and in the school were considered and controlled for as confounding factors. These descriptors were less subjective and recent studies suggest that years of experience may effect student achievement.

Statement of the Problem

The North Carolina State Board of Education has deemed the culture of a school to be so significant that it is included in their NCSSE as Standard 3, Cultural Leadership (NCDPI, 2006). However, Standard 3 does not specifically identify which aspects of culture may have a positive effect on student learning. The standard states that the school executive will "understand and act on the understanding of the important role a school's culture contributes to the exemplary performance of the school" (NCDPI, 2006). The NC TWCS is listed as an artifact that can be used to verify cultural leadership in NC schools. However, with over 80 items on the survey, the intent of its use by the principal to verify cultural leadership is unclear. Therefore, the problem is twofold: (1) How can the principal use the NC TWCS to understand the culture of their school, and (2) how can the

principal use the information gained from the NC TWCS to understand the school's achievement data? In other words, how can principals use the data that are currently available to them to understand their school's culture, its association with student achievement, and how can they use that information to make a difference in their schools? The language of the standard implies that the administrator understands this and should act upon that understanding.

Purpose of the Study

The purpose of this quantitative study is to explore the relationship between school culture (as indicated by teachers' responses to the TWCS Q7.3) and student achievement (as measured on North Carolina End-of-Grade tests). The outcome of this study will be the identification of elements of school working conditions, as perceived by teachers, which correlate with high student achievement.

As mentioned earlier, Q7.3 from the NC TWCS will be used in the statistical analysis for this study and the responses will be compared to student achievement data. Teachers were asked to rate their school leadership's response to their concerns in nine areas on Q7.3. The results of these analyses may help administrators understand the importance of creating a culture of responsiveness in their schools. Conversely, the consequences of perceived non-responsiveness on the part of school leadership may also be apparent. Reculturing the school, based on these analyses, could ultimately result in improved student learning as demonstrated through North Carolina school accountability measures like proficiency percentages on End-of-Grade tests.

The results of this study will build on the information gained through previous studies in order to better understand the connections between school culture and student

achievement. With this understanding, strategies may be developed to improve both culture and achievement. This study may more clearly define the processes needed to reculture a school in order to improve student learning as measured by annual standardized testing.

Significance of the Study

In December of 2006, the North Carolina State Board of Education approved the Ad Hoc Committee on School Administration's NCSSE. The document includes Cultural Leadership as Standard 3 and so the school executive should understand the aspects of a school's culture that impact student success and the school executive's role in transforming that culture.

This current study will attempt to add clarity to the body of knowledge surrounding the importance of school culture to the academic achievement of students. Specifically, school culture, understood as the impact of teachers' perceptions of school leadership responsiveness, will be explored in relationship to student achievement. The potential for the development of strategies for reculturing will be considered.

Research Questions

The following questions are central to this study:

1. How does school culture, as identified by respondents on the 2012 NC TWCS, relate to student achievement, as measured by 2012 North Carolina end-of-grade testing proficiency percentages?
2. Is the perception that school leadership addresses the concerns of teachers in specific areas of leadership (time, facilities and resources, professional

development, managing student conduct, instructional practices and support and new teacher support) related to student achievement?

3. What do the results of a study of the association between student achievement and teacher working conditions provide by way of specific guidance to building administrators who are focused on creating a school culture that will contribute to students' academic growth?

Overview of the Methodology

This study utilizes quantitative methodology to explore the dimensions of school culture in almost 2,500 North Carolina schools as described through the 2012 TWCS results. In order to answer Research Question #1, participants' responses to Q7.3 of the TWCS will be clustered to explore the relationship among the clustered responses, school culture and student achievement.

The emergent clusters or Leadership Perception Groupings (LPGs) will be compared to North Carolina's economic tiers and tested with oneway ANOVA for statistical significance. The LPGs will be further described through comparison to descriptors like TWCS participants' years of experience and their perception of community support, safe environment and overall satisfaction. The LPGs will be characterized geographically through the use of maps to reveal trends across the state. To answer Research Question #2, longitudinal regression will be used to understand the clustered responses at the school level and their impact on students' proficiency in grades 3-8 on the 2012 North Carolina End-of-Grade assessments. Finally, Research Question #3 will be addressed through the identification of correlations between school culture and

student achievement, which may help school administrators when working to *reculture* their school for student success as described in Standard 3 of the NCSSE.

Definition of Terms

School culture: The shared basic assumptions and espoused beliefs that exist in the (I) Professional Organization, (II) Organizational Structure, (III) Quality of the Learning environment, and (IV) Student-centered Focus (Schoen & Teddlie, 2008).

School climate: A number of variables in the school social environment including, but not limited to, academic futility, teacher expectations for students, teacher-student efforts to improve, perceptions of the principal's expectations, parental concern for quality education, perceptions of present school quality, and efforts of the principal to improve (Schoen & Teddlie, 2008).

North Carolina Teacher Working Conditions Survey: An anonymous online survey of every school-based educator in the state to assess teaching conditions at the state, district and local level.

NCSSE: a guide for school administrators as they continually reflect upon and improve their effectiveness as leaders (NCDPI, 2006)

Student Achievement: Student progress as measured by the annual administration of North Carolina End-of-Grade tests in reading, math and science.

Student achievement designations: Designations assigned to schools based on their proficiency and progress on the North Carolina End-of-Grade tests.

North Carolina school report card: An online document that provides achievement data about individual North Carolina schools.

Limitations of the Study

The results of this study will demonstrate whether an association exists between school culture and student achievement in North Carolina schools in 2012. Data will be observed and certain assumptions made regarding the correlation of culture and achievement. Data such as these are unable to support causative interpretations.

Since North Carolina does not utilize a survey designed to specifically measure school culture, data from the responses to a particular item on NC TWCS were used to approximate school culture. Q7.3 was a good match but some important aspects of school culture were not addressed in the sub-items of Q7.3. For example, the NC TWCS does not help to identify important beliefs and guiding principles that shape the culture of individual schools.

The student achievement data for this study were reduced from the 2012 data set that included scores and proficiency percentages from each school, tested grade and subject across the state. This study uses only percent proficient in reading and math, grades 3 – 8, as a measure of student achievement. Trend data and student growth were not considered.

Assumptions

For the purpose of this study, several assumptions are made. It is assumed that test data are accurate and a true reflection of students' academic achievement. It is also assumed that the responses given by respondents to the 2012 North Carolina TWCS are an accurate representation of the beliefs and experiences of licensed North Carolina educators regarding conditions in schools in North Carolina.

CHAPTER 2: REVIEW OF LITERATURE AND RESEARCH

The correlation between school culture and student achievement has long been assumed to be positive. Goodlad's (1984) breakthrough work, *A Place Called School*, details his research and analysis of one of the largest studies of American schools ever conducted. In his book, he noted, "teachers both condition and are conditioned by the circumstances of their school" (pp. 29-30). Goodlad (1984) asserted that each school has a culture, which suggests that the culture must be understood if change is to be, "more than cosmetic" (p. 16). Likewise, Marzano (2003) in his *Balanced Leadership* meta-analysis claimed that the culture of a school has a significant impact on student performance.

In order to understand the association between a school's culture and its achievement, school culture and student achievement must be defined. To understand the principal's role in establishing and maintaining a positive culture, the actions and behaviors of the principal must be identified, and then connected to the positive result in culture, achievement or both. It is an intuitively satisfying idea that schools with a positive culture and climate will have fewer discipline issues, more responsible students, a cohesive staff, a visionary leader and, therefore, higher levels of student achievement. A review of relevant literature affirms that intuition.

To organize the literature in the context of this study, the following guiding questions were considered.

1. What is school culture?
2. What is the best way to measure school culture?
3. How is school culture measured in North Carolina?

4. Is school culture associated with student achievement?

What is School Culture?

There is no single best definition of school culture (Deal & Peterson, 1999), but there are several commonalities across multiple definitions. Among them, school culture has been defined as "an inner reality" (Deal & Peterson, 1993) and, according to Robbins and Alvy (1995), "what organizational members care about, what they are willing to spend time doing, what and how they celebrate, and what they talk about" (p. 23, as cited at http://www.schoolculture.net). Phillips (1993) defined school culture as the "beliefs, attitudes, and behaviors that characterize a school in terms of: How people treat each other; The extent to which people feel included and appreciated; and rituals and traditions reflecting collaboration and collegiality" (p. 1). Wagner (2000) describes school culture as "shared experiences both in and out of school (traditions and celebrations), a sense of community, of family and of team."

School culture has been included in the generic concept of what makes a good school. In his research, Williams (2011) identified six characteristics of a good school, and Mitchell (2008) identified six elements of a positive school culture. While both researchers identified professional development as a characteristic or element, there the similarities end. Williams (2011) recognized (a) academic focus, (b) student-centeredness, (c) strong leadership, (d) positive climate and parent and (e) community involvement as the remaining characteristics of a good school, while Mitchell (2008) identified (a) collaborative leadership, (b) teacher collaboration, (c) collegial support, (d) unity of purpose and (e) learning partnerships as the hallmarks of a positive culture. The Ad Hoc Committee on School Administration described school culture as the traditions,

artifacts, symbols and positive values and norms of the school and community that result in a sense of identity and pride upon which to build a positive future (NCDPI, 2006).

In a study of middle grades, McCollum and Yoder (2011) noted that early adolescence is often accompanied by a decline in academic grades. Their study led them to the conclusion that the culture and social climate of a school are important elements in the schooling process. Their research revealed that student's relationships with their teachers in middle school is critical. McCollum and Yoder found that less positive and less supportive relationships negatively impacted student achievement.

A review of literature seeking to define school culture reveals a new and slightly different definition with each study. Schoen and Teddlie (2008) conducted a meta-analysis of research on school culture and created a framework consisting of four dimensions. The dimensions, (I) Professional Orientation, (II) Organizational Structure, (III) Quality of the Learning Environment and (IV) Student-Centered Focus, create the conceptual clarity the researchers sought to provide. Schoen and Teddlie's (2008) work is intended to provide a "common language to discuss and compare school culture" (p. 134). They go on to assert that this framework is "essential if one wants to test the validity of assertions that school culture is a major determinant of school improvement" (Schoen & Teddlie, 2008, p. 134).

The Students' Perspective

In a notable study commissioned by the United States Department of Education, (Pritchard, Morrow, & Marshall, 2005), 4th grade students, participants in the National Writing Project, were asked to write an essay about the culture of their school. Students were not given the criteria for a positive school culture, but were simply asked to describe

their schools. Two thousand writing samples were reviewed, and researchers found that the students that described their schools, teachers, classrooms and administrators positively wrote about interactions with adults, the physical surroundings at the school and traditions and activities that were important to them. These components of the students school life correspond well with Peterson and Deal's (1998) definition of school culture as "unwritten rules and assumptions, the combination of rituals and traditions, the array of symbols and artifacts, the special language and phrasing that staff and students use and the expectations about change and learning that saturate the school's world" (p. 1).

Articles in both scholarly and professional journals describe positive school culture and tout its importance to the success of students. In an article in *Principal*, Habegger (2008) describes positive school culture from three perspectives based on interviews with educators, students and parents. For students, positive culture is described as (a) having a sense of belonging, (b) experiencing positive relationships with adults, and (c) benefiting from clear direction. For teachers, positive culture is described as (a) empowering, (b) encouraging, and (c) maintaining a school-wide focus. For parents, positive culture is described as (a) complementary to school, (b) welcoming and (c) informed. Covey (2010) describes the positive culture of A. B. Combs Elementary School in Raleigh, North Carolina as having a "fun, clear 'work first, play later' character ethic, a passion to make a difference in their families and in the world. ...children with an extraordinary ability to work through differences and collaborate with both their peers and adults" (p. 3). McCaw (2007) cites Covey's understanding of the need for positive culture in *School Administrator*,

> Covey clearly understands the power and need for passion. It is the fuel that lights the fires of dreams, innovation and vision. It is a necessary ingredient in the work of continuous growth and development -- at both the individual and national levels. All that is good and right in our accomplishments, Covey would say, has been fueled with such passion. (p. 32)

The *Committee for Children* (2011), a nonprofit organization whose mission is to help create a world in which children can grow up to be peaceful, kind, responsible citizens, has published studies on social and emotional learning (http://www.cfchildren.org). In its *Second Step: Social Emotional Skills for Early Learning* research review, the organization describes positive culture in schools and early learning facilities as that which fosters social-emotional competence, self-regulation and school readiness. Like other descriptions of positive culture in schools, the *Committee for Children*'s notion of school culture mirrors Phillips' (1996) characterization of school culture as "the beliefs, attitudes and behaviors that characterize a school in terms of: how people treat each other; the extent to which people feel included and appreciated; and the rituals and traditions reflecting collaboration and collegiality."

In summary, the major aspects of school culture seem to include shared values and beliefs of the school, collaboration, collegial support, teacher regard, professional development, strong leadership, parent and community involvement, student centeredness, and academic focus. These threads run through the literature, as well as the North Carolina Standards for School Executives and the North Carolina Teachers Working Conditions Survey.

What is the Best Way to Measure School Culture?

Because of the subjective nature of school culture, it is difficult to measure. However, there are surveys that have been validated for studying the culture of a school. In their dissertation work, Williams (2011), Mitchell (2008), and Banatao (2011) quantify the culture of school by using surveys and interviews. MacNeil, Prater and Busch (2009) used the Organizational Health Inventory (OHI) to study the culture and climate of Texas schools.

Williams (2011) determined the six characteristics of a good school by using interview questions, and then narrowing the responses to six major areas: academic focus, student-centeredness, strong leadership, positive climate, professional development, and parent and community involvement.

In contrast, Mitchell (2008) adopted a quantitative approach, and used a survey developed by the College of Education, University of Missouri-Columbia to measure the culture of several schools in the southeast. Mitchell isolated six elements of positive school culture: (a) collaborative leadership, (b) teacher collaboration, (c) collegial support, (d) unity of purpose, (e) professional development and (f) learning partnerships.

In a similar fashion, Banatao (2011) used two surveys created to measure school culture in the state of California. The California Healthy Kids Survey (CHKS) and the Resilience Youth Development Module (RYDM) were used to gauge the culture in schools being studied (p. 70). Similarly, Banatao studied the Academic Performance Index (API) scores of seventh grade students in California. The API score is calculated by the California Department of Education's accountability system based on standardized test performance. When cross-referenced with responses on the California Healthy Kids

Survey (CHKS) and the Resilience Youth Development Module (RYDM), and after accounting for other study variables, Banatao (2011) found that the higher the report of school meaningful participation and school connectedness, the higher the API score.

As mentioned earlier, Pritchard, Morrow and Marshall (2005) used student voice to determine the status of school culture. Researchers collected writing samples from over 1,500 cities across the US in which students were asked to describe their schools. Over 2000 samples were evaluated. Students described their teachers, administrators, classrooms, school buildings, activities and interactions. The measure of school culture in this study was either positive or negative.

MacNeil et al. (2009) used the OHI to study 10 dimensions of school climate (goal focus, communication adequacy, optimal power equalization, resource utilization, cohesiveness, morale, innovativeness, autonomy, adaptation and problem-solving adequacy.) When results of the OHI were compared with results of the Texas Assessment of Academic Skills (TAAS), the researchers found that schools rated exemplary on the TAAS demonstrated higher scores on each of the 10 dimensions of organizational health as measured by the OHI.

How is School Culture Measured in North Carolina?

While intended to measure the working conditions in North Carolina's public schools, much of the North Carolina Teacher Working Conditions Survey closely aligns with the four dimensions of school culture described by Schoen and Teddlie (2008). The 72-question survey, which is administered bi-annually by *The New Teacher Center*, addresses the eight North Carolina Teacher Working Conditions Standards. The working conditions survey is administered bi-annually. The survey used in this study was

administered in the spring of 2012, and results became available online in the fall of that same year (“Frequently asked”, n.d.). Question 7.3 of the 2012 NC TWCS is an integral component of this study. Question 7.3 is a nine-part item of the NC TWCS that addresses each of the working conditions constructs, leadership issues, facilities and resources, use of time in school, professional development, teacher leadership, community support and involvement, managing student conduct, instructional practices and support, and new teacher support, in light of perceived school leadership concern ("North Carolina's Teacher," 2012).

Five questions from the 2012 NC TWCS were chosen for this study to help describe the respondents and to help explore commonalities among teachers who responded similarly to Q7.3. Teachers’ responses to two questions in the Introduction section of the 2012 NC TWCS regarding years of experience and years in their current school were used. In addition, Q4.1h: The community we serve is supportive of this school, Q5.1g: The faculty work in a school environment that is safe and Q10.6: Overall, my school is a good place to work and learn were used. Henry et al. (2014), assert in their article, *The Effects of Teacher Entry Portals on Student Achievement*, that a large body of research confirms the association between teachers’ experience and their effectiveness. Likewise, descriptor questions Q41.h, Q5.1g, and Q10.6 are shored up in literature in the work of Lezotte (1991). In what Lezotte (1991) describes as *second-generation correlates*, working in a safe environment, an authentic partnership between school and the community and the over-arching goal of an effective school and home for all children are characteristics of effective schools.

Does School Culture Affect Student Achievement?

Scholarly journals, trade journals, popular magazines and even Internet blogs have been written in recent years touting the importance of a school's culture to the achievement of its students. However, few studies illustrate the connection between culture and student achievement as clearly as the Department of Education's website ED.gov, Creating and Sustaining Successful K-8 Magnet Schools (USDOE, 2008). In this report, the U.S. Department of Education describes the transformation in school culture at A. B. Combs Elementary School in Raleigh, North Carolina from an extended-day magnet school to a Leadership Magnet (USDOE, 2008). The description of the culture of the school and subsequent improved student achievement as measured by North Carolina End-of-Grade tests (Covey, 2010; USDOE, 2008) illustrates the association between improving school culture and academic achievement.

As highlighted already, the U.S. Secretary of Education, Arne Duncan, said in an interview with the *Education Week*'s Gewertz (2009), that one of four viable options for transforming low-performing schools is to "revamp the culture" (p. 1). Duncan's declaration is supported by several studies that draw the conclusion that positive school culture results in positive student achievement. Mitchell (2008) correlated positive student achievement on state-mandated criterion referenced competency tests with six elements of positive school culture.

When considering leadership responsibilities, Marzano (2008) called culture, or the "extent to which a principal fosters shared beliefs and a sense of community and cooperation" (p. 8), a *first-order change* necessary for the improvement of student achievement. In a 2006 *Principal Leadership* article, Wagner cited a study in which

3,100 school culture assessments were performed between 1981 and 2006 and found "compelling anecdotal evidence" (p. 2) to suggest the connection between school culture and student achievement. Wagner cited another study by Melton-Shutt (2004) in which 66 elementary schools in Kentucky performed similarly when school culture survey results were compared to achievement results. In these studies and an additional study in Florida, in which 61 schools performed similarly to those in the Kentucky study, positive school culture survey results corresponded with high achievement scores (Cunningham, 2003).

Pritchard et al. (2005) connected school culture and student achievement by giving students voice in evaluating the culture of their school. Through the evaluation of student writing, the researchers learned that students, in grades 4, 8 and 11, who identified their schools as positive and described aspects of the school culture like teachers, interactions with adults, traditions, the physical setting and administrators in positive terms also scored highest on their writing samples (Pritchard et al., 2005).

Another strong correspondence between school culture and student achievement is demonstrated by the *School Development Program*, also known as the *Comer Model*, initially developed at Yale University in 1968 (Lunenburg, 2011). The program aims to improve the educational experience of children by improving school culture. The *School Development Program* builds supportive bonds among children, parents and school staff to create a positive school culture. Since its inception in 1968, the program has grown to include 1,150 schools, 35 school districts, 25 states and at least 6 countries. Studies show significant gains in achievement in these *Comer Model* schools.

In 1993, Donahoe wrote in the *Phi Delta Kappan* about a project conducted by Pacific Telesis Foundation to restructure three California elementary schools. As the president of the foundation, Donahoe led the comprehensive restructuring project, and found the key components of restructuring for success to be time, structure and the creation of a desired culture. Like the *Comer Model* and Goodlad (1984), Donahoe found that centrality of purpose is critical when creating a school culture that fosters student success. Through his work with the three diverse California elementary schools, Donahoe identified four categories that describe or impact culture and the overall effectiveness of schools. First, Donahoe perceived a mismatch between growth and resources in which resource allocation did not keep pace with expansion. Secondly, he noted the effect of the phenomenal expansion of ethnic, linguistic and cultural diversity in schools. Next he noted that the ideas of full inclusiveness and that all children can learn impacts the school culture. Finally, the social changes such as latchkey children, single-parent families, poverty and violence all come to bear on the culture of American schools. Donahoe's (1993) recommendations include, "the formal rearrangement of time in schools to allow them to create and sustain the kind of interactive culture and supportive infrastructure the need to improve student learning" (p. 305).

The impact of school culture is not limited to the U.S. context. For example, Negis-Isik and Gursel (2013) conducted an ethnographic case study of the culture of a successful primary school in Konya, Turkey. Turkish primary schools serve children from the age of 6 to 14 years and are compulsory (http://www.fulbright.org.tr/en/about-turkey/turkish-educational-system). In order to guide their research, Negis-Isik and Gursel identified four cultural commonalities among successful schools as identified

through a study of the literature. Negis-Isik and Gursel concluded that three of the characteristics, as described in the literature, were in line with their findings and that these three characteristics of positive school climate were the main factors in student achievement. Those characteristics are (a) teachers from different views have positive relationships, (b) teachers demonstrate shared attitudes in problem solving, and (c) school directors have leadership characteristics (Negis-Isik & Gursel, 2013).

School Culture and School Improvement

Evaluation of school culture is essential to the school improvement process (Lindahl, 2011). For school improvement to occur, the key cultural elements that contribute to student achievement must be identified and evaluated so that strategic planning can occur. Schein (1999) proposed that artifacts, the organization's values and shared assumptions should be examined and compared within sub-groups of the organization in order to identify the elements affecting culture. When applied to the educational setting, Schein's theory of organizational culture corresponds closely with the levels of school culture described by Schoen and Teddlie (2008). While qualitative methods, such as the writing samples in the Pritchard, Morrow and Marshall (2005) study offer a unique glimpse into students' ideas about school culture, the use of surveys is highly regarded as the best measure of people's perception of school culture (Halpin & Croft, 1963; National Association of Secondary School Principals, 1987; National Study of School Evaluation, 2005; Reliable Surveys, 2011; Sanaghan, Goldstein, & Roy, 2005).

The work of Schoen and Teddlie (2008) provides clarity and organization to the idea of school culture and its effect on student achievement. Their study of the work of researchers and scholars spans 40 years of literature and research. After a comprehensive

meta-analysis, Schoen and Teddlie have synthesized the knowledge base concerning school culture and created the *Comprehensive Model of School Culture*. The framework, which consists of four dimensions, subsumes the literature and research and offers a framework that is logical, structured, valid, and relevant for the purpose of evaluating school culture and strategic planning for school improvement. While the Comprehensive Model of School Culture is not an evaluation instrument or method, it encompasses the characteristics of school culture and provides a framework for analysis of data retrieved by quantitative or qualitative methods and thereby a step to strategic planning for school improvement.

What is the School Principal's Role in Creating, Maintaining, or Improving School Culture?

School principals have long been considered the CEOs of schools. As such, they are responsible for the daily operations, human resources, finances and the culture of their organization. Principals are held responsible for the success of the school in every regard. The style and focus of the administrator are among the factors impacting the culture and achievement of each school.

Sergiovanni (2001) described four models of management present in school administration: rational, mechanistic, organic and bargaining. His discussion of the organic model of management closely approximates cultural leadership as defined in the NCSSE. For example, Sergiovanni describes collaborative and effective work groups, commitment to common objectives and increased satisfaction. He asserted that collegial thinking among teachers would encourage "shared decision-making, joint planning, common goals, increased responsibility and more autonomy" (Sergiovanni, 2001, p. 16).

While these are desirable outcomes, Sergiovanni (2001) warns that the narrow focus on individual and group issues can preclude attention to the "larger social, political and legal context of educational administration" (p. 16).

In a study of twenty-first century leadership, Schrum and Levin (2013) explored three cases in which administrators' vision and leadership style reimagined school systems through the use of technology. The case of Mooresville Graded School District, in Mooresville, North Carolina, led the researchers to assert that collaborative problem-solving, distributed leadership, and shared responsibilities created significant change in the district despite the reality of limited resources, economic challenges, and the demand for higher and higher levels of student achievement. The characteristics of leadership described by Schrum and Levin were mentioned earlier in the description of school culture.

The principal's role in establishing a positive culture has been identified in Standard 3, Cultural Leadership, of the North Carolina Standards for School Executives (NCDPI, 2006). Williams' (2011) study of the 6 characteristics of a good school is based on principals' perceptions of what constitutes positive climate. Williams (2011) notes the significance of the identified themes as "principals provide the overall leadership, direction and influence for schools, which determines their effectiveness." In their study of school culture and student achievement, Pritchard et al. (2005) conclude that school culture is a reflection of school and district administration. They note that elementary school students who identify positive culture in their schools mentioned administrators "in abundance and frequently in positive terms (Pritchard et al., 2005)." In a study comparing Marzano's 21 Principal leadership responsibilities and 11 second-order

change behaviors, Nagy (2011) used *The Balanced Leadership Profile*, an online survey, and interviews with principals and focus groups to reach the conclusion that, "effective leaders need to cultivate a school culture that is action-oriented and focused on improving student achievement" (p. 167).

Danielson's 2007 article, The Many Faces of Leadership, describes aspects of school culture and suggests that teacher leaders are instrumental in establishing school culture. Danielson calls teachers the holders of institutional memory and states that because the demands of the principalship are "practically impossible to meet," teacher leaders can assume responsibilities that include influencing the daily lives of students. The NC TWCS, Question 7.3, addresses teachers' perception about their administrators' attention to their concerns about teacher leadership. Danielson (2007) asserts that teacher leadership is essential for school improvement and for helping teachers realize their full potential.

Habegger (2008) lays the responsibility for establishing positive school culture squarely at the feet of the principal. Through information gathered in interviews and personal experience, Habegger calls on principals to create a sense of belonging for students, a sense of empowerment for teachers, and a sense of informed participation for parents.

Visionary leadership was the focus of a 2006-2007 study by Mora-Whitehurst (2013). In the study, visionary leadership behaviors, including cultural leadership, were compared with the student achievement data of 75 Florida elementary schools. Mora-Whitehurst found that at grades four and five, principals' visionary leadership seems to affect student achievement. Mora-Whitehurst (2013) summarized that principals'

knowledge of the reading program, along with their capacity to act as instructional and visionary leaders may allow them to influence a school's reading program and increase students' reading scores.

Finally, on its ED.gov website, the United States Department of Education (USDOE, 2008) describes a scenario in which an actual principal took steps to "reculture" a school in Raleigh, North Carolina. The Creating and Sustaining Successful K-8 Magnet Schools Report describes the work of Muriel Summers, principal of A. B. Combs Elementary School and the results of the cultural transformation that occurred there in 2000. The report chronicles the changes and ultimately, the positive student achievement that ensued. The transformation is also described in several works by Stephen Covey (Covey, 2008, 2010).

Culture Enshrined in Standards

The idea that school culture impacts student achievement is so accepted that the state of North Carolina includes Cultural Leadership in its *North Carolina Standards for School Executives* (NCDPI, 2006). The Ad Hoc Committee on School Administration that developed these standards, in part, charges principals with the task of *reculturing* a school, if needed, to align with the school's goals of improving student and adult learning. These standards were adopted in December, 2006, by the North Carolina State Board of Education, and represent a paradigm shift for principals from managerial leadership to strategic, instructional, cultural, human resources, external development and micropolitical leadership. While the document includes a list of practices related to school culture, a concrete measure of the effectiveness of the practices is not given. It is assumed that, for the purpose of evaluation, the measure of school culture is the

achievement levels of the students in the school. For the purposes of their research, Pritchard et al. (2005) asserted that school culture can be recognized by outsiders. Pritchard et al. (2005) suggested that the "components of culture that have enough impact on students that students bring them up as examples when writing about their schools" may be indicative of the cultures of school districts as a whole (p. 154).

Transforming School Culture

While researchers offer evidence of the need for positive culture and examples of positive culture, according to Gewertz (2009), Duncan, the United States Secretary of Education, simply refers to the need to *revamp* school culture, and "change school cultures for improvement" (p. 2) as the means to change the school culture in the process of transforming low performing schools. According to Gewertz, Duncan's speeches and writings typically do not define school culture or the aspect of that culture that he recommends revamping, improving, or transforming.

Cultural Leadership

Through the inclusion of Standard 3, Cultural Leadership, for the North Carolina Standards for School Executives, and the establishment of the North Carolina Teacher Working Conditions Standards by the North Carolina Professional Teaching Standards Commission and the North Carolina State Board of Education, North Carolina has signaled that certain aspects of school culture are implicated in the success of North Carolina schools. According to The New Teacher Center, the eight Working Conditions Standards, (a) Time, (b) Facilities and Resources, (c) Community Support and Resources, (d) Managing Student Conduct, Teacher Leadership, (e) School Leadership, (f) Professional Development and (g) Instructional Practices and Support identify the aspects

of the life of the school that make teaching and learning successful (www.newteachercenter.org, 2010). In fact, according to The New Teacher Center (2012), the evaluation system for teachers and administrators in the state of North Carolina relies on the North Carolina Teacher Working Conditions Survey as a data artifact for educators to reflect on their practice and whether they are meeting state standards.

Summation

In this review of literature regarding school culture and student achievement, the connection has been considered from a variety of perspectives. First, school culture was defined and its measurement was reviewed. Then school culture was identified as a precursor to student achievement and the principal's role in establishing culture was identified. Finally, recommendations for further research were explored. Each of these components of this review is vital to the over-arching idea that school culture is associated with student achievement.

All of the sources cited here agree that school culture is important. The methods used for describing, measuring and clarifying levels of school culture differ greatly. The range of measures from survey to student voice indicates just how subjective the business of characterizing school culture can be. While validated surveys that measure school connectedness, belonging, and participation offer valuable information and insight, the student writing samples offer the most poignant insights into school culture. Students described the caring and kindness of adults, the levels of engagement of instructional activities and the arbitrary nature of discipline when describing their schools. Much of

the compelling information found in the Pritchard, Morrow and Marshall (2005) study could not have been gained through questionnaires and surveys.

Many sources verify the connection between school culture and student achievement. The studies of principals' behaviors and their effect on school culture offer practical applications of strategies to create positive cultures in schools. The statements from U.S. Secretary of Education, Arne Duncan, provide direction for building administrators regarding the transformation of school culture, but lack the substance necessary to carry out the expectation successfully.

However, the accounts of A. B. Combs Elementary School on the U. S. Department of Education website and in the works of Covey (2008) create a picture of positive transformation and reculturing that can serve as a model for principals struggling with Standard 3, Cultural Leadership, North Carolina Standards for School Executives. In order to affect positive changes in our schools, it is imperative that quantitative research be taken in conjunction with qualitative descriptions and explorations of positive culture and student achievement. Only then can the principal see positive culture in action and begin to plan strategically to reculture a school to align goals and "infuse the work of adults and students with passion, meaning and purpose" (NCDPI, 2006, p. 4).

CHAPTER 3: METHODOLOGY

The idea that school culture is paramount in improving student achievement is stated in Standard 3 of the North Carolina Standards for School Executives, and a snapshot of the elements of school culture is obtained bi-annually through the use of the North Carolina Teacher Working Conditions Survey (NC TWCS). While the survey is promoted as a measure of teachers' working conditions in North Carolina schools and a tool for improvement of those conditions, a close study of the NC TWCS reveals an association with many definitions of school culture found in the literature. For example, Peterson (1999) described positive school culture as one with underlying norms, collegiality, improvement and hard work. North Carolina Teacher Working Conditions Standards (2011) address the respective characteristics in 6a: "an atmosphere of trust and mutual respect is pervasive in the school (p. 21);" 6d: "school leadership makes sustained efforts to improve teaching and learning conditions" (p. 22); and 8b: "teachers are supported to work collaboratively" (p. 24).

In order to determine the connection between school culture and student achievement, data were used from the 2012 NC TWCS to examine the relationship between school culture and student achievement, as demonstrated on the 2012 North Carolina End-of-Grade tests in grades 3-8 in mathematics and reading. Data on school culture were observable at the teacher level while achievement data from the 2012 NC End-of-Grade tests were available at the school and LEA level. In order to relate the data sets, teacher data had to be aggregated to school and LEA levels. This will be discussed in the context of the individual analyses.

Context

This study involved an analysis of public domain information obtained from the North Carolina Department of Public Instruction (achievement data) and NC TWCS data. The population of interest in this study includes all of the schools in North Carolina. The 2012 NC TWCS was administered to over 87,000 educators in over 2,429 schools across the state. In order for results to be published, at least 40% of licensed educators in the school were required to respond or at least 5 faculty members.

Eighty-six percent of all licensed educators participated in the 2012 NC TWCS. School response that met participation requirements can be broken down as follows: 99.7% of traditional public schools, 61% of charter schools, and 76% of special schools. Therefore, in this study, the sample of teachers' responses represents a majority report of the whole state.

The ultimate goal was to determine if significant associations among the NC TWCS data and student achievement exist, to determine whether other factors such as teacher experience, length of time in current school, or economic tier of the LEA are related to the significance of the correlation, and then to offer these observations to practicing administrators as a way of clarifying NCSSE Standard 3 and association between school culture and student achievement.

The following research questions are central to this study:

1. How does school culture, as identified by respondents on the 2012 North Carolina Teacher Working Conditions Survey, relate to student achievement, as measured by 2012 North Carolina end-of-grade testing proficiency percentages?

2. Is the perception that school leadership addresses the concerns of teachers in specific areas of leadership (time, facilities and resources, professional development, managing student conduct, instructional practices and support and new teacher support) related to student achievement?
3. What do the results of a study of the association between student achievement and teacher working conditions provide by way of specific guidance to building administrators who are focused on creating a school culture that will contribute to students' academic growth?

Sources of Data

Data from the 2012 NC TWCS and from the North Carolina testing program were available in the public domain. Both the New Teacher Center (for the 2012 NC TWCS) and the North Carolina Department of Public Instruction provided spreadsheets of their raw data for analysis. Economic designations reported by the North Carolina Department of Commerce were also included in the analysis. These data were obtained and analyzed in order to enable the economic tiers of LEAs to be taken into account. The incorporation of economic tier data enabled the economic environment in which the LEAs were situated to be taken into account as a confounding factor in any potential correlations between school culture and student achievement. Likewise, years of experience and years of employment in current school were considered potentially confounding factors. Confounding factors can be considered as extraneous influences on the data collected (Creswell, 2012). It was essential to the value of this study that the findings were adjusted for the confounding influences mentioned so that the association

between the independent variable (school culture) on the dependent variable (student achievement) could be clearly revealed (Turner & Thayer, 2001).

Background to the NC TWCS

According to the New Teacher Center ("Validity and Reliability," 2012) the North Carolina Teachers Working Conditions Survey (NC TWCS) was developed and piloted in 2001 to address two issues. The North Carolina Department of Public Instruction wanted to determine (a) if working conditions standards established by the North Carolina Professional Teaching Standards Commission were in place across the state, and, perhaps more importantly, (b) to understand how working conditions affect teacher retention across the state. The NC TWCS is a collaborative effort of the California-based New Teacher Center, the North Carolina Professional Teaching Standards Commission and the North Carolina Department of Public Instruction.

In 2004, the survey was administered online for the first time with a full report and detailed analysis being issued following compilation of results. When comparing 2012 responses to 2010 results, the New Teacher Center found that results remained relatively stable with less than four percentage points change on any question on the survey ("Listening to North," 2013). All districts reached at least 59% of teacher participation on the 2012 survey (New Teacher Center, 2013).

The 2012 NC TWCS, which includes 72 items, measures teachers' perceptions in eight major areas: time, facilities and resources, community support and involvement, managing student conduct, teacher leadership, school leadership, professional development, and instructional practice and support. The survey questions are aligned with the North Carolina Working Conditions Standards (2011). In the weeks preceding

the survey, educators are encouraged to participate in the survey by the state superintendent, local district administrators, and even the governor. In a document that addresses frequently asked questions, The New Teacher Center (2012) ensures anonymity through its reporting methods. According to the New Teacher Center document, results are reported by whole school making it impossible to connect a single response to an individual respondent.

Validity. The 2012 NC TWCS is identical to the 2010 NC TWCS. The New Teacher Center analyzed the psychometric soundness of the survey and found that it was a reliable and valid measure of the working conditions in participating schools ("Validity and Reliability," 2012). Content validity, or the extent to which a measure represents all facets of a given concept, has been evaluated since the survey's inception in 2002. In 2004, a sample of teachers was asked to rank the importance and relevance of all of the survey questions on the 2004 instrument. Questions were compared in a factor analysis and questions rated as the most important also had the highest factor loadings in the analysis. Through this process a core battery of questions was established. The core questions remained in use in 2012. Correlations were run to test for significance between perceptual and reality questions. Statistically significant and meaningful correlations were identified. Construct validity, or the degree to which the survey measures the eight theoretical constructs – time, managing student conduct, school leadership, professional development, teacher leadership, facilities and resources, community support and involvement, and instructional practices and support – was conducted using confirmatory and exploratory factor analyses. Questions were identified that loaded the most strongly for each factor and therefore were the best measure for that area. Strong connections

were identified between success on the state's performance composite and certain conditions of work being present in a participating school. The predictive validity of the survey was particularly evident when there was a perception that the faculty was committed to helping all children learn. "Having a safe and supportive environment with sufficient instructional resources was recognized as a necessity" ("Validity and Reliability," 2012, p. 3).

Reliability. Reliability, or the consistency of measurement, was determined through a series of analyses that measured the presence of various aspects of teaching conditions. Subscales within the eight constructs were assessed for reliability. Internal consistency within the constructs was tested using Cronbach's alpha. An alpha coefficient ranges from 0-1. All eight constructs of the NC TWCS had alphas above 0.863 demonstrating reliability ("Validity and Reliability," 2012). According to Gall, Gall, and Borg (2010), a reliability coefficient, such as Cronbach's alpha, of .80 or higher is considered reliable for most research.

The NC TWCS in Determining Effectiveness

Teachers and administrators alike are asked to consider results of the NC TWCS when determining their own effectiveness. Specifically, principals and assistant principals are held accountable for the eight North Carolina Standards for School Executives (Public Schools of North Carolina, 2011). Standard 3 of NCSSE demands that administrators understand the role of school culture in exemplary school performance. For example, the summary of Standard 3, Cultural Leadership, states, "School executives will understand the important role a school's culture contributes to the exemplary performance of the school," and "A school executive . . . must be able to

infuse the work of adults and students with passion" (NC Standards for School Executives, 2011, p. 4). Intuitively, these aims are worthwhile but, from an accountability standpoint, they are not measurable. The NCSSE includes suggestions intended to provide examples of what an effective practice looks like in each of the eight standards. Standard 3 lists the NC TWCS as an artifact of cultural leadership. A comparison of the survey constructs to the practices described in Standard 3, Cultural Leadership, reveals that the practices align very closely with the areas addressed in the NC TWCS (2012).

NC TWCS Question 7.3

Question 7.3 from the NC TWCS (2012) was used to evaluate the correlation between school culture and student achievement. Question 7.3 is a nine-part item of the NC TWCS that addresses each of the working conditions constructs, plus new teacher support, in light of perceived school leadership concern ("North Carolina's Teacher," 2012).

The responses to NC TWCS Question 7.3 serve as a surrogate for school culture in this study. NCSSE (2011) Standard 3, Cultural Leadership, includes nine practices that are equated with effective cultural leadership. The practices, if carried out by building administrators, would be observable by educators participating in the NC TWCS and the practices reflect the sub-items in Question 7.3 closely. For example, the first practice described in Standard 3 says that the administrator creates a collaborative work environment (Public Schools of North Carolina, 2011). In the context of Q7.3, creating a collaborative work environment involves leadership issues, use of time in the school, teacher leadership, instructional practices and support and new teacher support. Another

Standard 3 practice states that the administrator should communicate strong ideals and beliefs about schooling, teaching and professional learning to teachers, staff, parents and students and then operate according to those beliefs. This practice, in the context of Q7.3, relates to community support and involvement and leadership issues. The suggested practice of guiding disciplined thought and actions of staff and students, as well as promoting a sense of well-being among staff, students and parents, incorporates Q7.3 sub-item, managing student conduct. The disciplined thoughts and actions of staff and students both lead to, and are a result of, well-managed student conduct. Providing and utilizing quality professional development, another sub-item of Q7.3, integrates with empowering staff to implement creative, 21st century concepts for school improvement.

Table 1 illustrates the conceptual relationship between the practices suggested to demonstrate cultural leadership in NCSSE (2011) Standard 3 and the nine sub-items of NC TWCS (2012) Q7.3 developed by the researcher for this study. The columns represent the NC TWCS (2012) Q7.3 sub-items and the rows represent the practices listed in Standard 3. As shown in Table 1, the column sub-items "leadership issues," "teacher leadership," "instructional practices" and "new teacher support" seem to have the strongest relationship to the Standard 3 practices, while the other sub-items follow closely behind. The nearly all of the column sub-items are associated with the Standard 3 rows "practices 21st century creativity", "empowering staff," "a sense of well-being," "shared beliefs and values," "continuous improvement," and "a collaborative work environment."

Table 1

NC TWCS Constructs and NCSSE Standard 3 Practices

	Leadership Issues	Facilities & Resources	Use of Time	Professional Development	Teacher Leadership	Community Support & Involvement	Managing Student Conduct	Instructional Practices & Support	New Teacher Support
Collaborative work environment	**X**		**X**	**X**	**X**			**X**	**X**
Communicates strong beliefs and vision	**X**				**X**			**X**	**X**
Culture of continuous improvement	**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**
Shared values, belief and vision, sense of community	**X**		**X**		**X**	**X**		**X**	

Table 1 (continued)

	Leadership Issues	Facilities & Resources	Use of Time	Professional Development	Teacher Leadership	Community Support & Involvement	Managing Student Conduct	Instructional Practices & Support	New Teacher Support
Acknowledges failures, celebrates successes	**X**				**X**			**X**	**X**
Culturally responsive	**X**				**X**	**X**			
Promotes a sense of well-being	**X**	**X**	**X**	**X**	**X**		**X**		**X**
Empowers staff	**X**		**X**	**X**	**X**	**X**	**X**		**X**
21st century creativity	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**

A shared sense of purpose and underlying norms of collegiality, improvement and hard work are commonly held descriptors of positive school culture (Peterson & Deal, 1998), and the NCSSE identifies school culture as a contributory factor to exemplary school performance. Q7.3 addresses practices identified in Standard 3 of the NCSSE. The sub-items of Q7.3 strongly suggest a system of shared beliefs and values when responses indicate that teachers agree or strongly agree that their school leadership addresses their concerns in each of the nine areas mentioned. Therefore, the results to Q7.3 provide a representation of the culture of a school, based on the perceptions of the school's teachers.

NC Achievement Data

North Carolina state law requires that all North Carolina public schools administer year-end or course-end tests. Year-end tests are taken by all students from grade 3 through 8, with end-of-course tests required for students who take high school courses while still in middle schools. The participation rate for students in statewide assessments is 95%. According to the North Carolina Department of Public Instruction (NCDPI, 2012), 2% of statewide data were eliminated from the data set by the NCDPI. Those eliminated were 18 schools that were special education schools, vocational/career schools or hospital schools, 28 schools that had insufficient data and 3 schools that were in violation of the rule requiring 95% student participation in testing. Forty-two charter schools were not included in the study because of low participation in the survey or dissolution of their charter (North Carolina Department of Public Instruction, 2012).

Example: LEA 520, Jones County

Table 2 is a breakdown of LEA 520, Jones County Schools, included here as an example of available data and for discussion. This table provides the data for the entire district, and is an

Table 2

LEA 520 Jones County – Sample Data

LEA	Subject	Grade	Test	Population	N=Number of students tested	Mean % Proficient	Median
520LEA	MA	3	ALL	TOT	89	61	68.5
520LEA	MA	4	ALL	TOT	75	60	80
520LEA	MA	5	ALL	TOT	82	69	84.1
520LEA	MA	6	ALL	TOT	98	86	87.8
520LEA	MA	7	ALL	TOT	86	71	82.6
520LEA	MA	8	ALL	TOT	76	67	88.2
520LEA	RD	3	ALL	TOT	89	52	58.4
520LEA	RD	4	ALL	TOT	75	46	61.3
520LEA	RD	5	ALL	TOT	82	67	81.7
520LEA	RD	6	ALL	TOT	98	76	77.6
520LEA	RD	7	ALL	TOT	86	51	59.3
520LEA	RD	8	ALL	TOT	76	57	75

example of the available data for each LEA in North Carolina. This table shows that the math and reading scores (MA and RD) for all students (TOT). In grade 3, the N is 89, the mean percentage proficient in Math is 61, and the median of percent proficient is 68.5. Elementary schools in LEA 520 include pre-K through sixth grade. Table 2 shows that mean percent proficiency in math rises from third grade (61%) through sixth grade (86%). When students enter the middle school (grades 7 and 8), the mean percent proficiency in math falls to 67-71% range.

Table 3 shows the data for school #304 within LEA 520. School #304 is a Pre-K through 6th grade school. End-of-Grade test data for grades 3-6 are shown in this table. Shown here are the results for the entire population of third graders (special education students included) for all versions of the test (ALL). The chart indicates that 18 third grade students were tested in mathematics and 13 were proficient (72.2%).

Annual Reporting of Achievement Levels

The NC Department of Public Instruction's Accountability Division reports a great deal of descriptive information with annual test data including race and ethnicity, students with disabilities and proficiency for each achievement level, 1-4. Achievement levels were established by the state as a way to create a common language about what is expected at various levels of competence on end-of-year assessments. Level I is considered insufficient mastery to be successful at the next grade level. Level II indicates inconsistent mastery of fundamental knowledge and skills that are minimally sufficient to be successful at the next grade level. Level III students consistently demonstrate mastery of grade level content and are considered well-prepared for the next grade level. Level IV is considered consistent performance at a superior level that is beyond what is required for success at the next grade level. Because this study

Table 3

School Sample Data

School Code	Subject	Grade	Test	Population	N=Number of Students Tested	Number Proficient	% Proficient
520304	MA	3	ALL	TOT	18	13	72.2
520304	MA	4	ALL	TOT	14	12	85.7
520304	MA	5	ALL	TOT	16	14	87.5
520304	MA	6	ALL	TOT	22	17	77.3
520304	RD	3	ALL	TOT	18	10	55.6
520304	RD	4	ALL	TOT	14	11	78.6
520304	RD	5	ALL	TOT	16	14	87.5
520304	RD	6	ALL	TOT	22	19	86.4

examines the effects of school culture on student achievement, student achievement was measured by whole-group percent proficiency at the grade, school and LEA level.

The data file, retrieved from the North Carolina Department of Public Instruction, included data by LEA and school. Proficiency measures, as well as developmental scale scores, were provided by subject, both separately and as a composite score. For the purpose of this study, percent proficiency scores for reading and math in grades 3 through 8 were used as the indicators of student achievement. As stated above, these measures were available for 95% of all North Carolina students, and represent standards by which all children are assessed, grades 3-8.

Economic Tiers

Annually, the North Carolina Department of Commerce uses a statute-mandated formula to designate each of North Carolina's 100 counties as Tier 1, Tier 2 or Tier 3 ("NC Dept.," 30). According to the Department of Commerce website, the formula uses statistical data based on the assessment of employment rates, median household income, population growth, and assessed property value per capita. Article 3J of North Carolina General Statutes mandates that the 40 most distressed counties are designated Tier 1, the next 40 are designated Tier 2 and the 20 most prosperous counties are designated as Tier 3. The Department of Commerce uses the tier system as a framework for granting higher tax credits to businesses for hiring and eligible business property expenditures within the lower tier counties ("NC Dept.," 30). Figure 1 illustrates the spread of tiers across the state.

Research Design and Analysis

As mentioned earlier, data were collected for this study using the NC TWCS (2012), and from 2012 NC End-of-Grade tests. The NC TWCS invites responses from teachers across the state and results are reported at the teacher level, by school. In order to explore potential

Adapted from "Thrive in North Carolina," *2011 county tier designations*. (2011). Retrieved from https://www.nccommerce.com/research-publications/incentive-reports/2011-county-tier-designations.

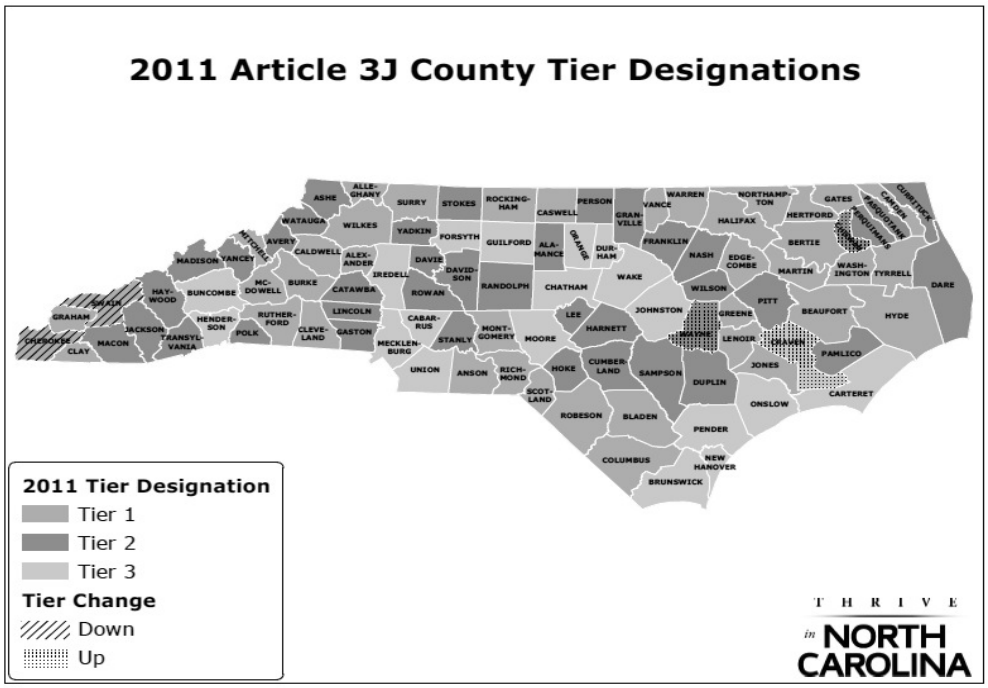


Figure 1. 2011 NC County tier designations.

relationships implicit in the data, a hierarchical cluster analysis was implemented. The underlying rationale of this analysis was that if logical clusters of teachers—based on their response to the elements of Question 7.3—were teaching in situations characterized by similar leadership environments, associated with comparable assessment outcomes, then this association is worthy of note and further theorizing and research.

Statistical Methods

This section describes the statistical methods used in this study. In subsequent sections, the methods will be discussed relative to their actual use in the study. Chapter 4 details the results from the methods.

Hierarchical cluster analysis. Cluster analysis is the task of grouping a set of objects, or in this case, respondents, in such a way that respondents in the same cluster are more similar to each other than to respondents in other clusters. For this analysis, agglomerative hierarchical clustering was used. Through agglomerative hierarchical clustering, an observation or cluster of observations is merged with another cluster until the number of clusters shrinks to the final number specified (Rencher & Christensen, 2012). Using Ward's Method, an agglomerative clustering algorithm that builds the cluster based on an objective function, such as error sum of squares, the respondents were clustered according to their distance apart (Bartholomew, Steele, Irini, & Galbraith, 2008). Ward's Method produces clusters that, at each step, have the smallest variance within the clusters (Bartholomew et al., 2008).

T-test. The t-test is used to reject the null hypothesis that two sample means come from the same population. For this study, the null hypothesis was that the economic tier of the LEA did not occur more frequently in any of the cluster groups. A p-value of $<.05$ was used to determine significance. The result of the test is reported as a t-statistic and aligned with a p-

value (Frankfort-Nachmias & Leon-Guerrero, 2009). T-tests were performed to determine the significance of the difference of the means of the samples (Rowntree, 2004).

Analysis of Variance (ANOVA). ANOVA assesses the null hypothesis that the mean value of the outcome will be the same across all populations (Vittinghoff, Shiboski, Glidden, & McCulloch, 2005). If the means are statistically significantly different, then the group means are too different to have occurred by chance. A p-value of <0.05 was used to determine significance.

Longitudinal regression. Longitudinal models are typically used to study a single unit over multiple observations (Gall, Gall, & Borg, 2010). However, repeated measures are also appropriate when studying groups within a single unit when a similar response is expected due to similarities within the unit or similar protocol treatments within the unit (Vittinghoff et al., 2005). This analysis is necessary and appropriate when there is non-independent data; that is to say that there is inherent correlation between the subjects within the data. Compound symmetry assumes that the correlation is constant regardless of the number of subjects in the data set (Kincaid, 2005). This type of correlation is also called exchangeable and is estimated from the data that all correlations are a common value. This correlation is assumed when there is nothing to distinguish one member of a unit from another – they can be considered exchangeable (Vittinghoff et al., 2005). The usual mechanism for longitudinal regression is replicated measures by the same individual subject. However, in studies with other similarities like within families, within geographic areas, or, as in this study, within schools and within LEAs, longitudinal regression is also applicable (Vittinghoff et al., 2005). This type of analysis is needed in this study because it is assumed that pairs of schools within the same LEA will be more associated to each other than to pairs of schools from different LEAs. It was estimated that

the schools within the unit were similar because of aligned policies, procedures, protocols and economic tier within the district.

Software versions. The output for the longitudinal regression for this paper was generated using SAS software, Version 9.3 of the SAS System for Windows. Copyright 2013 SAS Institute Inc. SAS and all other SAS Institute Inc. products or service names are registered trademarks or trademarks of SAS Institute Inc., Cary, NC, USA. All other analyses were generated by JMP®, Version Pro 10.0.0. SAS Institute Inc., Cary, NC, 1989-2007.

Five-Cluster Solution

Data from the 2012 NC TWCS were available for the over 87,000 teachers who participated in the 2012 survey. In order to make sense of the data and to use them for comparison with achievement data, hierarchical cluster analysis was implemented to explore subgroups of associated data. Since there were five possible Likert-style responses for each sub-item of Q7.3 on the 2012 NC TWCS, a five-cluster solution was specified. The purpose of the cluster analysis was to create groupings of respondents that reflected perceptions of leadership and could be used to determine the effect of school culture on student achievement.

At the beginning of the process, the data set of over 87,000 respondents consisted of over 87,000 single-respondent clusters. Using Ward's method, the 87,000 single-respondent "clusters" were merged until it converged on the specified five-cluster solution. The analysis produced five Leadership Perception Groupings (LPG) that were used to determine the effect of school culture on student achievement.

The cluster analysis highlighted educationally salient differences among the five clusters that became clear when they were displayed in stacked bar graphs. Initially, respondents were clustered by their aggregate responses to Q7.3, based on a 5-point Likert scale (Strongly

Disagree, Disagree, Agree, Strongly Agree, Don't Know). Each cluster was named, for ease of reference, based on the predominant characteristic of the responses in the cluster.

NC TWCS Variables

In order to understand the ways that the five LPGs related to the respondents' context, the groups were cross-tabulated with other descriptive questions in the NC TWCS (2012). The analysis was conducted in order to determine if different demographic groups perceived or experienced school leadership differently. For example, this analysis provided the information that the "Don't Know" response was chosen mostly by teachers with the least experience. Initially, the LPGs were compared with experience as an educator, years of experience in the current school, sense of safe environment, supportive community, overall satisfaction in the workplace and economic tier of the LEA. In order to understand the groupings more fully, the five demographic and context descriptor questions from the 2012 NC TWCS were cross-tabulated with the five LPGs. The results suggest commonalities underlying the agglomerations that resulted in the five LPGs. While all of these questions helped to describe the LPGs, only years of experience as an educator, years employed in the current school, and economic tier were included in the final multivariate analysis.

As discussed previously, counties in North Carolina are classified according to indicators of socio-economic status annually by the North Carolina Department of Commerce (2011). These tier designations were considered to be a possible factor in the analysis of school culture. In order to determine significance of each county's tier designation to the NC TWCS responses, LEAs were coded in the data set as Tier 1, 2 or 3 and t-tests were performed.

Matching NC TWCS and Outcomes Data

The major issue in examining potential associations between NC TWCS and student achievement outcome data is that each dataset has a different level of standard unit. The base level of the NC TWCS is the teacher within a particular school while the student achievement data's base unit is the average score or proficiency level of a set of students in a particular grade within a particular school. Oftentimes, the scores in the outcome dataset come from multiple classrooms with several different teachers. Likewise the teachers in the NC TWCS do not identify which classroom or grade level they teach. Therefore any connection between these two datasets comes from aggregating or adjusting the data so they speak on the same level.

For comparison of the five LPGs to the outcomes data, the group data, which is at the teacher-respondent level, had to be scaled up to the school level so that it could be matched with achievement data. LEA and school are associated with each respondent in the NC TWCS (2012) data set. Therefore, the scaling up was accomplished by matching teachers' LPG with their school, effectively creating the possibility of 5 indicators that measure the school's culture for each school site – teachers in LPG1, LPG2, LPG3, LPG4 and LPG5. It is plausible that each school had a percentage of teacher respondents that were included in each one of the 5 groupings. It is impossible to know whether teacher respondents to the NC TWCS (2012) were math or reading teachers, however it became possible to observe the correlations between high or low concentrations of teachers within a grouping and the percentage of proficiency in reading and math at each grade level.

To begin to focus on the impact that the concentration of each LPG had on the outcomes data, a median split was performed on each grouping. By splitting the grouping at the median, it was possible to more closely interpret the composition of the LPGs and to designate a level at

which the LPG begins to affect the outcomes data. The split groups were simply designated high concentration if they fell above the median and low concentration if they fell below the median. Because the means of multiple samples were to be analyzed, t-tests were used to establish broad associations between the median split groups (high concentration or low concentration of teachers in each grouping) and the percentage of proficiency in reading and in math at each grade level, 3 – 8. In this case, the null hypothesis was that the outcome data would be the same across all median-split LPGs at the grade and subject level.

Observation of the significance of each LPG as related to student achievement data can serve as a predictor for the degree of student success on certain grade level and subject End-of-Grade tests. For example, a high concentration of teachers in LPG1 may correlate with high reading or math results while a high concentration of teachers in LPG4 may correlate with lower math or reading scores at a particular grade level. When the data were further refined by making adjustments for confounding factors, significant effects of the median split LPGs on percentage of proficiency in reading and math, grades 3 – 8, were clearly observable.

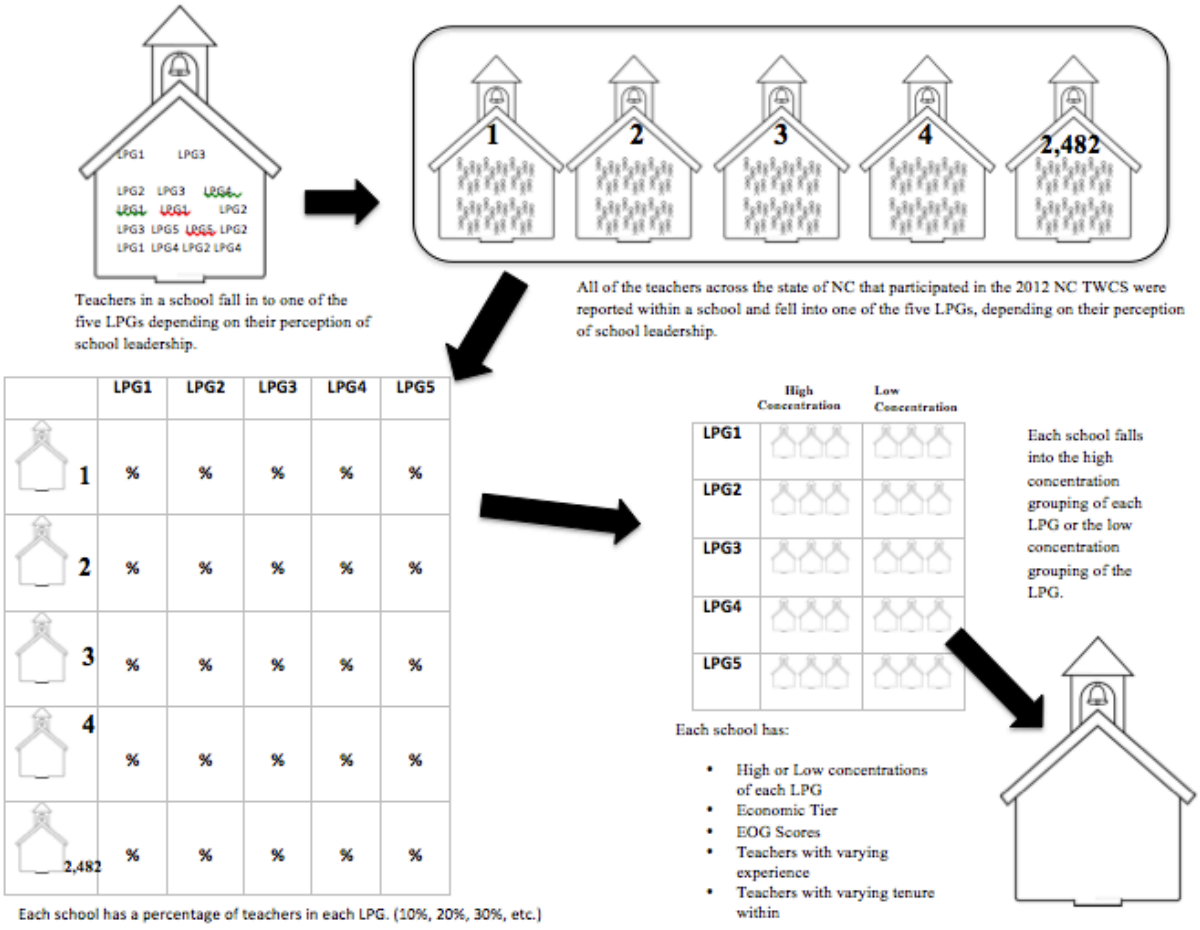
Finally, the research questions were addressed using longitudinal regression models to analyze the significance of the median-split levels. The unit of analysis was the LEA and the repeated measures were the schools within the LEA.

Results were adjusted for each of the confounding factors, economic tier, years of experience as a teacher and number of years in the current school. The adjustment was necessary because it was important to isolate the effect of school culture on student achievement. The surrogate for school culture in this study, NC TWCS (2012) Q7.3 largely reflects the behavior of school leadership in establishing the culture of the school. It was critical to eliminate

any confusion regarding the actual effect of school culture and the confounding factors and to remove possible pretexts for levels of student achievement.

Results of the longitudinal model as it relates to mean proficiency adjusted for years of experience as an educator, years employed in the current school and economic tier is reported in the study. The output is reported in two forms. There is a set of regression equations with *p*-values comparing every level of each variable to a reference group, as well as adjusted means that compare high and low concentration groups (median split LPGs) after adjusting for the other important variables, economic tier, years of teaching experience and years working in the current school. All *p*-values were included in the results tables so that the reader can understand the degree of significance of the influence of each of the LPGs on each of the dependent variables, percent proficiency in reading and math by grade levels.

The infographic included as Figure 2 depicts the conceptual schema for the analysis that is central to this study. Of particular note is the aggregation of teachers in each LPG with their like-minded colleagues within a particular school (top row), leading to the identification of the percentages of teachers in each LPG in each school (bottom left), and the imposition of a split (arbitrarily based on the median) of the identification into “high” and “low.” This process facilitates the characterization of a school in terms of concentration of “high” or “low” LPGs, economic tier, EOG scores, level of experience among teachers, and levels of teacher tenure.



The path from LPG identification to the median split at the school level.

Figure 2. Infographic.

CHAPTER FOUR: RESULTS

The purpose of this study was to explore the relationship between school culture and student achievement, as measured on North Carolina End-of-Grade tests and, as a result, identify practices and behaviors that can be recommended to building administrators for reculturing a school. As stated in chapter 3, responses to a nine-part item of the 2012 North Carolina Teachers Working Conditions Survey (NC TWCS) were compared to 2012 North Carolina End-of-Grade test percent proficiency results for grades 3-8 on composite reading and math scores. Quantitative methods were used to analyze data and the findings are presented here using a variety of statistical procedures.

Teacher Working Conditions

This first analysis section focuses on the data gathered as part of the 2012 NC TWCS administration across the state of North Carolina. In particular, it focuses on the data from just one subsection of one of the questions: Question 7.3.

NC TWCS Q7.3

Q7.3 from the NC TWCS (2012) was used to evaluate the correlation between school culture and student achievement. Q7.3 is a nine-part item of the NC TWCS that addresses each of the working conditions constructs, plus new teacher support, in the light of perceived school leadership concern ("North Carolina's Teacher," 2012). Q7.3 reads:

> The school leadership makes a sustained effort to address teacher concern about:
>
> Leadership issues, facilities and resources, use of time, professional development, teacher leadership, community support and involvement, managing student conduct, instructional practices and support, and new teacher support. (New Teacher Center, 2012, p. 11).

Participants were invited to respond on a 5-point Likert scale (1-Strongly Disagree, 2-Disagree, 3-Agree, 4-Strongly Agree, 5-Don't Know).

In the summary description of Standard 3 of the NCSSE, Cultural Leadership, it is stated that:

> A school executive must be able to 'reculture' the school if needed to align with school's goals of improving student and adult learning and to infuse the work of the adults and students with passion, meaning and purpose. Cultural leadership implies understanding the school as the people in it each day, how they came to their current state, and how to connect with their traditions in order to move them forward to support the school's efforts to achieve individual and collective goals ("North Carolina Standards," 2011, p. 4).

This study uses responses to Q7.3 of the 2012 NC TWCS to analyze and describe the culture of the school. Teachers' responses to Q7.3 can provide data regarding the perception of school leadership's response to the concerns of teachers in the school and can provide a barometer of the culture of the school from the teachers' perspective. When compared with 2012 student achievement data, correlations can be drawn between school culture and its association with student achievement. This information can be useful to administrators seeking to determine whether their school's culture is associated with their students' proficiency and whether "reculturing," as suggested in Standard 3, is necessary for school improvement.

NC TWCS Q7.3 Results

The following section begins with an overview of the statewide survey results on each of the sub-items of Q7.3 from the 2012 NC TWCS, administered in the spring of 2012. Following the overview, a discussion of the five-cluster (LPGs) solution as a means for more fully understanding the respondents' perceptions of their school leadership's response to their

concerns will provide contextual relevance for the use of Q7.3 as a proxy for school culture in this study.

Overview

Responses from across North Carolina to Q7.3 indicated that licensed personnel working in traditional schools were generally positive about their administrators' responses to their concerns in the nine areas addressed in the item (see Table 4). Overall, 77.14% of respondents agreed or strongly agreed that the school's leadership makes a sustained effort to address their concerns. Negative responses (disagree or strongly disagree) were given by 16.64% of respondents, and an average of 6.2% of the respondents indicated that they did not know about their school leadership's effort. The greatest level of agreement or strong agreement related to school leadership's response to teachers' concerns about Instructional Practices and Support (83.5%), suggesting that instructional leadership is perceived to be a strength among the majority of school administrators in North Carolina. Instructional support is an important factor in cultural leadership and is mentioned in several of the guiding practices for Standard 3 of the NCSSE ("North Carolina Standards," 2011, p. 4) including a collaborative work environment, shared beliefs and vision, building a sense of efficacy and empowerment, and the implementation of creative 21st century concepts for school improvement. The strongest negative responses, 22% each, were in the areas of use of time and managing student conduct. The highest percentage of "Don't Know" responses was to the New Teacher Support component of item Q7.3.

Table 4

NC TWCS Q7.3 Results

	Strongly Disagree	Disagree	Agree	Strongly Agree	Don't Know	Total
Leadership Issues	4,337	12,591 19.4%	50,975	12,076 72.4%	7,163 8.2%	87, 142
Facilities and Resources	2,839	8,949 13.6%	56,084	14,789 81.52%	4,281 4.9%	86,942
The use of time in my school	4,157	14,999 22.0%	50,498	12,891 72.8%	4,474 5.1%	87,019
Professional Development	3,231	12,100 17.6%	53,279	13,917 77.2%	4,529 5.2%	87,056
Teacher Leadership	2,773	9,777 14.4%	55,336	13,715 79.4%	5,397 6.2%	86,998
Community Support and Involvement	2,350	8,204 12.1%	56,125	14,435 81%	5,883 6.8%	86,997
Managing Student Conduct	5,434	13,774 22.1%	49,950	14,545 74%	3,416 4%	87,119
Instructional Practices and Support	2,553	8,034 12.2%	56,701	16,029 83.5%	3,753 4.3%	87,070
New Teacher Support	3,800	10,481 16.42%	48,515	14,468 72.4%	9,716 11.2%	86,980

Cluster Analysis of NC TWCS

This study compares student achievement across the state with teachers' satisfaction with their administrators' attention to their concerns about use of time, managing student conduct, school leadership, professional development, teacher leadership, facilities and resources, community support and involvement, instructional practices and support, and new teacher support — data gleaned from Q7.3. In order to explore potential relationships implicit in the data, a cluster analysis was implemented. The underlying rationale of this analysis is that if logical groupings of teachers - based on their response to the elements of Q7.3 - were teaching in situations characterized by similar leadership environments and assessment outcomes, then this association is worthy of note and further theorizing and research.

Details of each grouping are named and described here. In summary, Leadership Perception Group 1 (LPG1) consists of respondents who mostly strongly agree that their administrators make a sustained effort to address teacher concerns about the nine constructs. LPG1 consists of 11,644 respondents or 13.30 %. Leadership Perception Grouping 2 (LPG2) respondents mostly agree with some variation to strongly agree. LPG2 consists of 31,530 respondents or 36.01%. Leadership Perception Grouping 3 (LPG3) all agree, with no variation. LPG3 consists of 26,851 respondents or 30.67%. Leadership Perception Grouping 4 (LPG4) mostly disagrees with some strong disagreement. LPG4 consists of 12,155 respondents or 13.88%. Leadership Perception Grouping 5 (LPG5) mostly don't know. LPG5 consists of 5,382 respondents or 6.15% (see Table 5).

Table 5

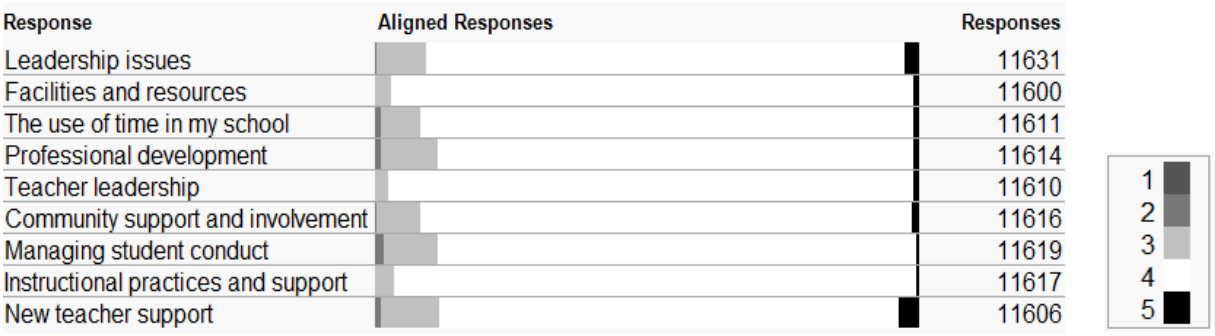
Five Cluster Solution

Grouping Name	Description	N	%
LPG1	Most Strongly Agree	11,644	13.30%
LPG2	Mostly Agree – Some Strongly Agree	31,530	36.01%
LPG3	All Agree – No Variation	26,851	30.67%
LPG4	Mostly Disagree – Some Strongly Disagree	12,155	13.88%
LPG5	Mostly Don’t Know	5,382	6.15%

In Figures 3-6, each of the LPGs is depicted by a stacked bar graph that shows the relationship of each of the nine sub-items within the LPG. The gradients, 1-5, correspond to the five responses on the Likert scale (1 – Strongly Disagree, 2 – Disagree, 3 – Agree, 4 – Strongly Agree, 5 – Don't now). Following the stacked bar graph for each LPG, is a table presenting the share of responses for each of the nine sub-items of Q7.3.

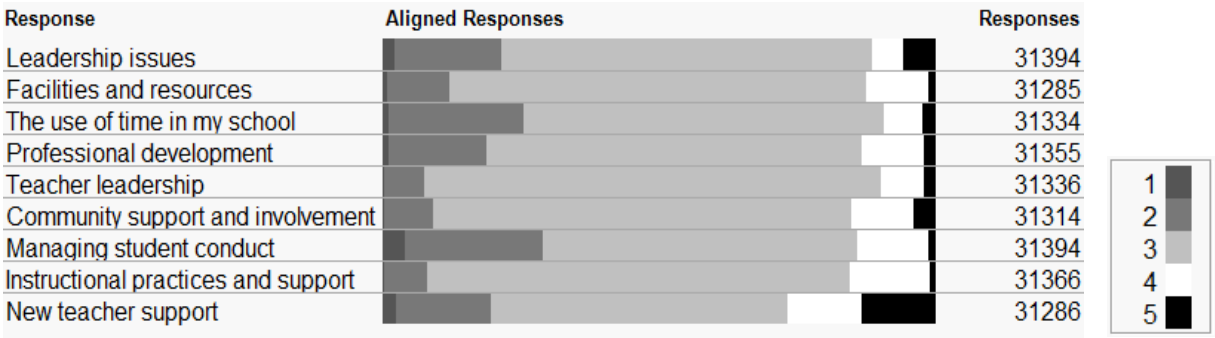
LPG1: Mostly strongly agree. LPG1 represents 13.3% of the survey participants that responded to Q7.3. The stacked bar graph (see Figure 3) shows that most of the respondents in this grouping strongly agree that their administrators address their concerns regarding the nine constructs of this survey. The respondents in LPG1 feel most strongly about their school leadership's treatment of their concerns about "teacher leadership." As shown in Table 6, 97% strongly agree that those concerns were addressed. Ninety-six percent strongly agree that their concerns about "instructional practices" are addressed. There is minimal variation in LPG1. While the number of respondents that strongly agree that their concerns are being addressed is relatively uniform, the largest percentage of "Don't Know" responses occur to the item regarding "new teacher support."

LPG2: Mostly agree, some strongly agree. LPG2 consists of 36.01% of survey participants that responded to Q7.3. The stacked bar graph (see Figure 4) shows that most of the respondents in LPG2 agree that their administrators address their concerns regarding the nine sub-items of this question. The stacked bar graphs used here to illustrate the LPGs seem to indicate that there is minimal variation in this LPG2, but more than the variation in LPG1. While the number of respondents that agree with each construct is relatively uniform (around 31,000 respondents) there is variation particularly in the "managing student conduct" and "new teacher support" constructs. While less than LPG1 at 96%, respondents in LPG2 also have the



LPG1: Mostly Strongly Agree. The gradients, 1-5, correspond to the five responses on the Likert scale (1 – Strongly Disagree, 2 –Disagree, 3 - Agree, 4 – Strongly Agree, 5 – Don't Know).

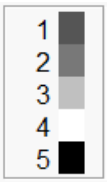
Figure 3. LPG1.



LPG 2: Mostly Agree, Some Strongly Agree. The gradients, 1-5, correspond to the five responses on the Likert scale (1 – Strongly Disagree, 2 –Disagree, 3 - Agree, 4 – Strongly Agree, 5 – Don't Know).

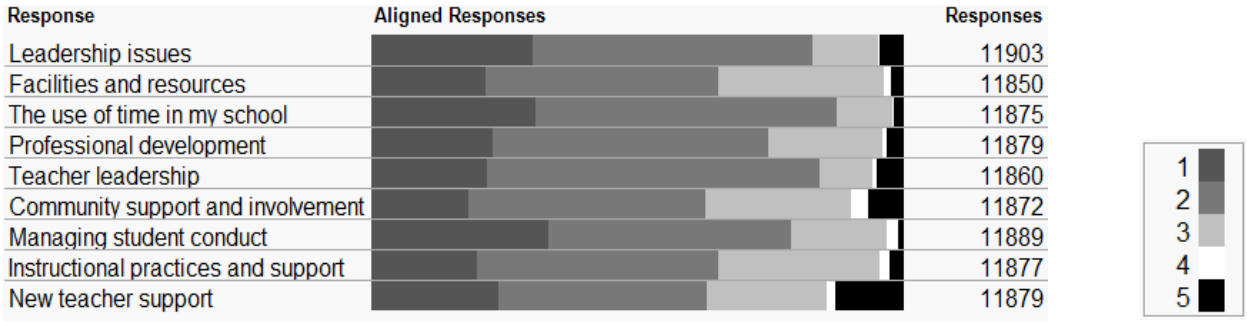
Figure 4. LPG2.

Response	Aligned Responses	Responses
Leadership issues		26851
Facilities and resources		26851
The use of time in my school		26851
Professional development		26851
Teacher leadership		26851
Community support and involvement		26851
Managing student conduct		26851
Instructional practices and support		26851
New teacher support		26851



LPG3: All Agree, No Variation. The gradients, 1-5, correspond to the five responses on the Likert scale (1 – Strongly Disagree, 2 –Disagree, 3 - Agree, 4 – Strongly Agree, 5 – Don't Know).

Figure 5. LPG3.



LPG4: Mostly Disagree, Some Strongly Disagree. The gradients, 1-5, correspond to the five responses on the Likert scale (1 – Strongly Disagree, 2 –Disagree, 3 - Agree, 4 – Strongly Agree, 5 – Don't Know).

Figure 6. LPG4.

Table 6

LPG1 Distribution of Responses

	1-Strongly Disagree	2-Disagree	3-Agree	4-Strongly Agree	5-Don't Know	Total Responses
Leadership Issues	4 <1%	63 <1%	1,037 9%	10,245 88%	282 2%	11,631
Facilities & Resources	5 <1%	32 <1%	320 3%	11,154 96%	89 <1%	11,600
Use of Time in My School	17 <1%	124 1%	859 7%	10,508 91%	103 <1%	11,611
Teacher Leadership	2 <1%	27 <1%	274 2%	11,216 97%	91 <1%	11,610
Community Support & Involvement	5 <1%	62 <1%	917 8%	10,501 90%	131 1%	11,616
Managing Student Conduct	22 <1%	179 2%	1,136 10%	10,249 88%	33 <1%	11,619
Instructional Practices & Support	6 <1%	26 <1%	366 3%	11,205 96%	14 <1%	11,617
New Teacher Support	20 <1%	117 1%	1,241 11%	9,826 85%	402 3%	11,606

strongest agreement regarding teacher leadership, with 83% agreement that their concerns are addressed in that area (see Table 7).

LPG3: All agree, no variation. LPG3 represents 30.67% of survey participants that responded to Q7.3. The stacked bar graph (see Figure 5) shows that all of the respondents in LPG3 agree that their administrators address their concerns regarding all nine sub-items of this question. The number of respondents that agree with each construct is a uniform 26,851 respondents (see Table 8).

LPG4: Mostly disagree, some strongly disagree. LPG4 represents 13.88% of survey participants that responded to Q7.3. The stacked bar graph (see Figure 6) shows that most of the respondents in this LPG4 disagree that their administrators address their concerns regarding the nine sub-items of this question most of the time. This grouping appears to have the most variation but is one of the smaller groupings with around 11,900 respondents. As shown in Table 9, the respondents in LPG4 expressed their strongest disagreement with their school leadership regarding "use of time in my school." Combined disagree and strongly disagree responses for their school leadership's attention to their concerns regarding this issue is 88%, which is closely followed by strong disagreement or disagreement regarding "teacher leadership" from 85% of respondents. LPG4 members also report strong disagreement or disagreement regarding their school leadership's attention to their concerns about "leadership issues" (83% combined) and "managing student conduct" (79% combined). While most of respondents disagree that the sub-items are addressed by their administrators (see Table 9), there is some agreement that their concerns regarding facilities and resources (31%), community support and involvement (28%), and instructional practices and support (30%) are addressed. Similar to

Table 7

LPG2 Distribution of Responses

	1-Strongly Disagree	2-Disagree	3-Agree	4-Strongly Agree	5-Don't Know	Total Responses
Leadership Issues	706 2%	6,041 19%	21,119 67%	1,774 6%	1,754 6%	31,394
Facilities & Resources	237 <1%	3,581 11%	23,668 77%	3,424 11%	375 1%	31,285
Use of Time in My School	376 1%	7,708 25%	20,335 65%	2,280 7%	635 2%	31,334
Teacher Leadership	157 <1%	2,226 7%	25,990 83%	2,408 7%	555 2%	31,336
Community Support & Involvement	157 <1%	2,744 8%	23,711 76%	3,480 11%	1,222 4%	31,314
Managing Student Conduct	1,320 4%	7,768 25%	17,952 57%	3,956 13%	398 1%	31,394
Instructional Practices & Support	144 <1%	2,482 8%	23,983 76%	4,529 14%	228 <1%	31,366
New Teacher Support	797 2%	5,336 17%	16,768 54%	4,224 14%	4,161 13%	31,286

Table 8

LPG3 Distribution of Responses

	3-Agree	Total Responses
Leadership Issues	26,851 100%	26,851
Facilities & Resources	26,851 100%	26,851
Use of Time in My School	26,851 100%	26,851
Teacher Leadership	26,851 100%	26,851
Community Support & Involvement	26,851 100%	26,851
Managing Student Conduct	26,851 100%	26,851
Instructional Practices & Support	26,851 100%	26,851
New Teacher Support	26,851 100%	26,851

Table 9

LPG4 Distribution of Responses

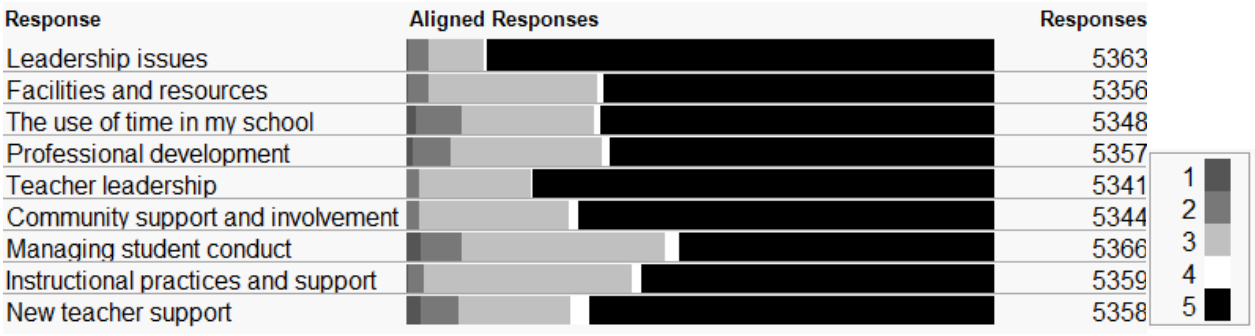
	1-Strongly Disagree	2-Disagree	3-Agree	4-Strongly Agree	5-Don't Know	Total Responses
Leadership Issues	3,595 30%	6,309 53%	1,465 12%	32 <1%	502 4%	11,903
Facilities & Resources	2,569 22%	5,165 44%	3,700 31%	142 1%	274 2%	11,850
Use of Time in My School	3,673 31%	6739 57%	1,250 11%	53 <1%	160 1%	11,875
Teacher Leadership	2,604 22%	7,423 63%	1,192 10%	73 <1%	568 5%	11,860
Community Support & Involvement	2,176 18%	5,302 45%	3,275 28%	356 3%	763 6%	11,872
Managing Student Conduct	3,963 33%	5,446 46%	2,160 18%	212 2%	108 <1%	11,889
Instructional Practices & Support	2,375 20%	5,386 45%	3,601 30%	209 2%	306 2%	11,877
New Teacher Support	2,846 24%	4,686 39%	2,633 22%	233 2%	1,481 13%	11,879

LPG1 and LPG2, the largest percentage of "Don't Know" responses occurs in the "new teacher support" construct.

LPG5: Mostly don't know. LPG5 represents 6.15% of survey participants that responded to Q7.3 and is the smallest grouping with only about 5,300 respondents. The stacked bar graph (see Figure 7) shows that most of the respondents in this LPG5 report that they don't know whether their administrator makes a sustained effort to address their concerns regarding the nine sub-items of this question. There is some variation in LPG5, and the largest number of "Don't Know" responses occurs in the question regarding "leadership issues" (86%, see Table 10). Table 10 shows that LPG5 also has a high percentage of "Don't Know" responses to their school leadership's treatment of teacher leadership (78%), and community support and involvement (70%).

Descriptor Questions

In order to understand the groupings more fully, the five demographic and context descriptor questions from the 2012 NC TWCS were cross-tabulated with the five LPGs. The results from the cross-tabulation charts suggest commonalities underlying the agglomerations that resulted in the five LPGs. The charts that follow provide information that will enable school administrators to understand the composition of the LPGs more fully. For example, Table 11 shows that the 11-20 year experience range, which is the largest span at 10 years (with the exception of the open-ended 20+ years range), constitutes the largest percentage of each LPG. However, Table 12 indicates that the 4-6 years of experience in current school group is the highest percentage of each LPG, which seems to indicate that many teachers change their workplace after 6 years. Of the teachers in LPG1, most strongly agree that their work environment is safe (81.16%, see Table 13), that they have community support (58.92%, see



LPG5: Mostly Don't Know. The gradients, 1-5, correspond to the five responses on the Likert scale (1 – Strongly Disagree, 2 –Disagree, 3 - Agree, 4 – Strongly Agree, 5 – Don't Know).

Figure 7. LPG5.

Table 10

LPG 5 Distribution of Responses

	1-Strongly Disagree	2-Disagree	3-Agree	4-Strongly Agree	5-Don't Know	Total Responses
Leadership Issues	32 <1%	178 3%	503 9%	25 <1%	4,625 86%	5,363
Facilities & Resources	28 <1%	171 3%	1,545 29%	69 1%	3,543 66%	5,356
Use of Time in My School	91 2%	428 8%	1,203 22%	50 <1%	3,576 67%	5,348
Teacher Leadership	10 <1%	101 2%	1,029 19%	18 <1%	4,183 78%	5,341
Community Support & Involvement	12 <1%	96 2%	1,371 26%	98 2%	3,767 70%	5,344
Managing Student Conduct	129 2%	381 7%	1,851 34%	128 2%	2,877 54%	5,366
Instructional Practices & Support	28 <1%	140 3%	1,900 35%	86 2%	3,205 60%	5,359
New Teacher Support	137 3%	342 6%	1,022 19%	185 3%	3,672 69%	5,358

Table 11

Descriptor Questions: Experience as Educator

How many total years have you been employed as an educator?	LPG1: Mostly Strongly Agree	LPG2: Mostly Agree, Some Variation	LPG3: Mostly All Agree, No Variation	LPG4: Mostly Disagree, Some Variation	LPG5: Mostly Don't Know
First Year	630 5.42%	1,867 5.93%	1,494 5.57%	499 4.11%	708 13.16%
2-3 Years	760 6.54%	2,826 8.97%	2,328 8.68%	976 8.04%	611 11.36%
4-6 Years	1,571 13.51%	4,850 15.40%	4,139 15.43%	1,857 15.29%	923 17.16%
7-10 Years	1,947 16.75%	5,681 18.04%	5,058 18.85%	2,284 18.80%	884 16.44%
11-20 Years	3,805 32.73%	9,752 30.96%	8,275 30.85%	4,024 33.13%	1,416 26.33%
20+ Years	2,913 25.06%	6,518 20.70%	5,533 20.62%	2,506 20.63%	836 15.54%
Total Frequencies	11,626	31,494	26,827	12,146	5,378

Table 12

Descriptor Questions: Total Years in Current School

How many total years have you been employed in the school in which you are currently working?	LPG1: Mostly Strongly Agree	LPG2: Mostly Agree, Some Variation	LPG3: Mostly All Agree, No Variation	LPG4: Mostly Disagree, Some Variation	LPG5: Mostly Don't Know
First Year	1,925 17.12%	4,479 14.67%	3,951 15.25%	1,291 10.99%	1,692 32.33%
2-3 Years	1,980 17.61%	5,557 18.19%	4,662 17.99%	2,097 17.85%	975 18.63%
4-6 Years	2,676 23.80%	7,721 25.28%	6,303 24.33%	3,147 26.79%	1,115 21.30%
7-10 Years	1,840 16.36%	5,584 18.28%	4,743 18.30%	2,315 19.71%	664 12.69%
11-20 Years	2,046 18.19%	5,429 17.78%	4,597 17.74%	2,240 19.07%	616 11.77%
20+ Years	778 6.92%	1,772 5.80%	1,655 6.39%	656 5.58%	172 3.29%
Total Frequencies	11,245	30,542	25,911	11,746	5,234

Table 13

Descriptor Questions: Working in a Safe Environment

Q5.1g The faculty works in a school environment that is safe.	LPG1: Mostly Strongly Agree	LPG2: Mostly Agree, Some Variation	LPG3: Mostly All Agree, No Variation	LPG4: Mostly Disagree, Some Variation	LPG5: Mostly Don't Know
Strongly Disagree	42 <1%	307 <1%	90 <1%	917 7.72%	76 1.44%
Disagree	88 <1%	1,743 5.62%	573 2.17%	2,202 18.54%	360 6.82%
Agree	2,005 17.50%	18,553 59.79%	18,712 70.94%	7,110 59.87%	3,521 66.67%
Strongly Agree	9,298 81.16%	10,270 33.10%	6,942 26.32%	1,531 12.89%	1,176 22.27%
Don't Know	24 <1%	158 <1%	60 <1%	115 <1%	148 2.80%
Total Frequencies	11,457	31,031	26,377	11,875	5,281

Table 14), and they have the highest level of overall satisfaction (77.73%, see Table 15). As might be expected, teachers in LPG4 have the lowest percentage of strong agreement to the same questions. As mentioned in chapter 2, this evokes Maslow's assertion that the best managers increase the health of their workers by providing for their safety, creating friendly relationships, and establishing a sense of community (Schott, 1992).

As mentioned in previous chapters, only the questions regarding years of experience in the profession, and years of experience in the school from the NC TWCS were considered as confounding factors in the forthcoming multivariate analysis. The relationship between educators' years of experience and student achievement has been explored in a number of studies, and economically disadvantaged status defines a sub-group for disaggregation of school test data by NCDPI. Since these demographic indicators have been established in the literature as having an influence on student achievement, the decision was made to control for their affects in the statistical model.

The demographic and context questions used to discern underlying commonalities are:

- How many total years have you been employed as an educator?
- How many total years have you worked in the school where you are now employed?
- Q5.1g The faculty works in a school environment that is safe.
- Q4.1h The community we serve is supportive of this school.
- Q10.6 Overall, my school is a good place to work and learn.

Total years employed as an educator. As the data in Table 11 show, teachers in their first year constitute a smaller percentage of all LPGs, except LPG5, than do teachers in their later years of teaching. This may be a reflection of the reality that there are fewer first year teachers than there are "second and third year" teachers, and so forth. This consistent incremental

Table 14

Descriptor Questions: Supportive Community

Q4.1h The community we serve is supportive of the school.	LPG1: Mostly Strongly Agree	LPG2: Mostly Agree, Some Variation	LPG3: Mostly All Agree, No Variation	LPG4: Mostly Disagree, Some Variation	LPG5: Mostly Don't Know
Strongly Disagree	76 <1%	634 2.02%	232 <1%	1254 10.39%	155 2.89%
Disagree	387 3.34%	4,173 13.29%	2,026 7.58%	3,490 28.92%	764 14.23%
Agree	4,141 35.74%	19,273 61.38%	19,437 72.74%	5,845 48.44%	2,853 53.13%
Strongly Agree	6,827 58.92%	6,185 19.70%	4,501 16.84%	890 7.38%	653 12.16%
Don't Know	155 1.34%	1,136 3.62%	527 1.97%	588 4.87%	945 17.60%
Total Frequencies	11,586	31,401	26,723	12,067	5,370

Table 15

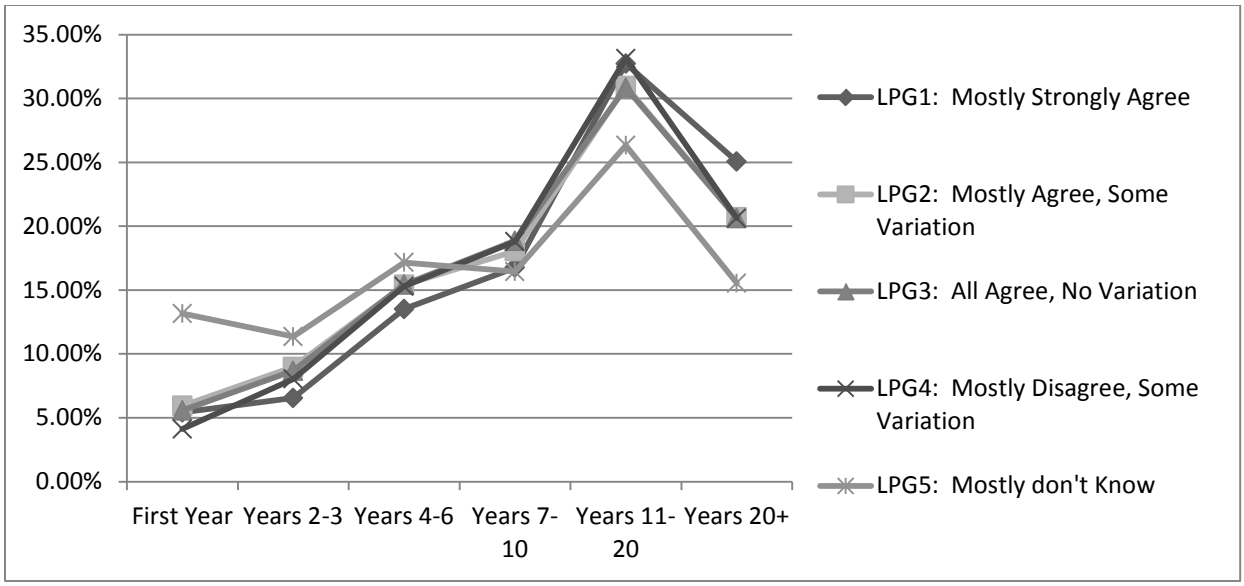
Descriptor Questions: Overall Satisfaction

Q10.6 Overall, my school is a good place to teach and learn.	LPG1: Mostly Strongly Agree	LPG2: Mostly Agree, Some Variation	LPG3: Mostly All Agree, No Variation	LPG4: Mostly Disagree, Some Variation	LPG5: Mostly Don't Know
Strongly Disagree	1,383 11.89%	1,581 5.02%	1,598 5.96%	1669 13.80%	227 4.23%
Disagree	70 <1%	2,471 7.85%	554 2.07%	3,753 31.02%	583 10.86%
Agree	1,124 9.66%	17,094 54.29%	13,605 50.74%	5,553 45.90%	3,164 58.95%
Strongly Agree	9,040 77.73%	9,988 31.72%	10,955 40.86%	806 6.66%	1,176 21.91%
Don't Know	13 <1%	350 1.11%	100 <1%	316 2.61%	217 4.04%
Total Frequencies	11,630	31,484	26,812	12,097	5,367

increase across the age categories is an artifact of uneven spreads of categorization of experience in the NC TWCS. For example, “first year” covers a single year spread of experience, “2-3 years” covers a two-year spread of experience, “4-6 years” covers a three-year spread of experience, and similarly until “11-20 years” covers a ten-year spread of experience. It is to be expected that there will be a greater percentage membership of all five LPGs consistently across the first five categories of teaching experience, and this is illustrated by the close correspondence of the near linear graphs in Figure 8 (there is a slightly higher percentage representation in LPG5, which would accord with the expectation that teachers in their first year may not know many details). Finally, the “20+ years” spread of experience is open-ended, and encompasses the reality of attrition through life events such as retirement.

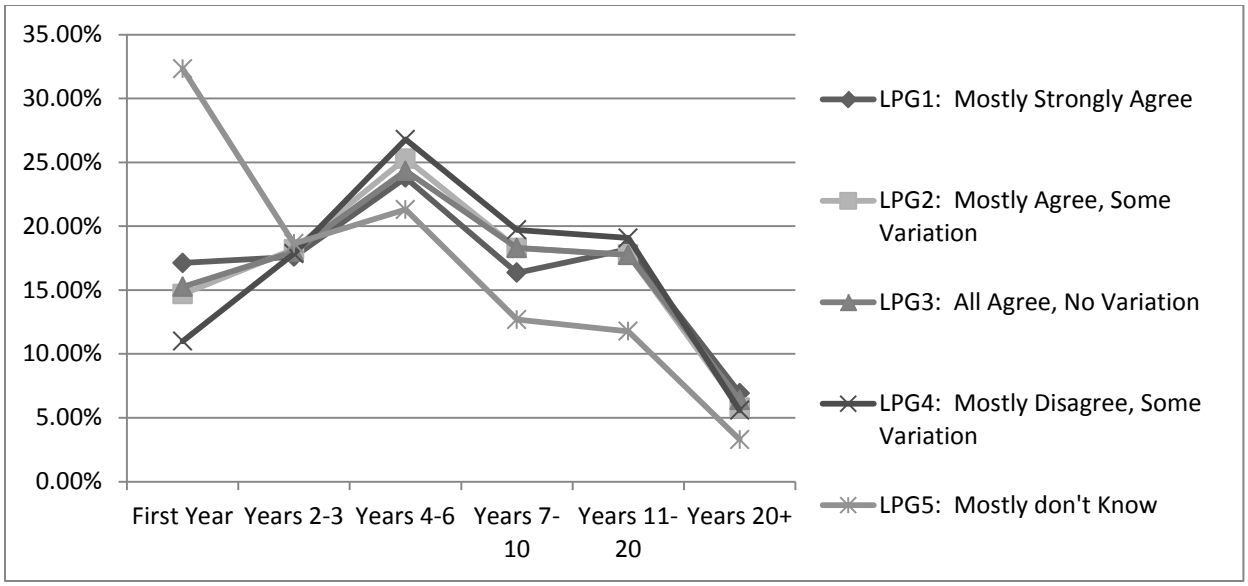
Total years in current school. The second descriptor question asks respondents how long they have worked in their current school. The teachers in their first year in their current school constitute the highest percentage in LPG5, while teachers in the 4-6 years of experience range made up the largest percentage of the other LPGs (see Table 12). Figure 9 again shows the data in a visual form, in this instance, highlighting the situation of teachers in their first year in a school who are still learning the culture of the school.

Working in a safe environment. Standard 3 of the NCSSE (2011) states that the school executive, “promote a sense of well-being among staff, students and parents” (p. 6). The cross-tabulated chart for Q5.1g (see Table 13) and the LPGs indicates that most of the respondents in all 5 LPGs agree or strongly agree that their work environment is safe. LPG4 respondents indicate the highest level of disagreement or strong disagreement at 26.26%, and LPG5 follows at 8.26%. Figure 10 suggests that the issue of a safe working environment is fairly consistent across LPGs with LPG1 being the most satisfied with the safety in their schools. Figure 10



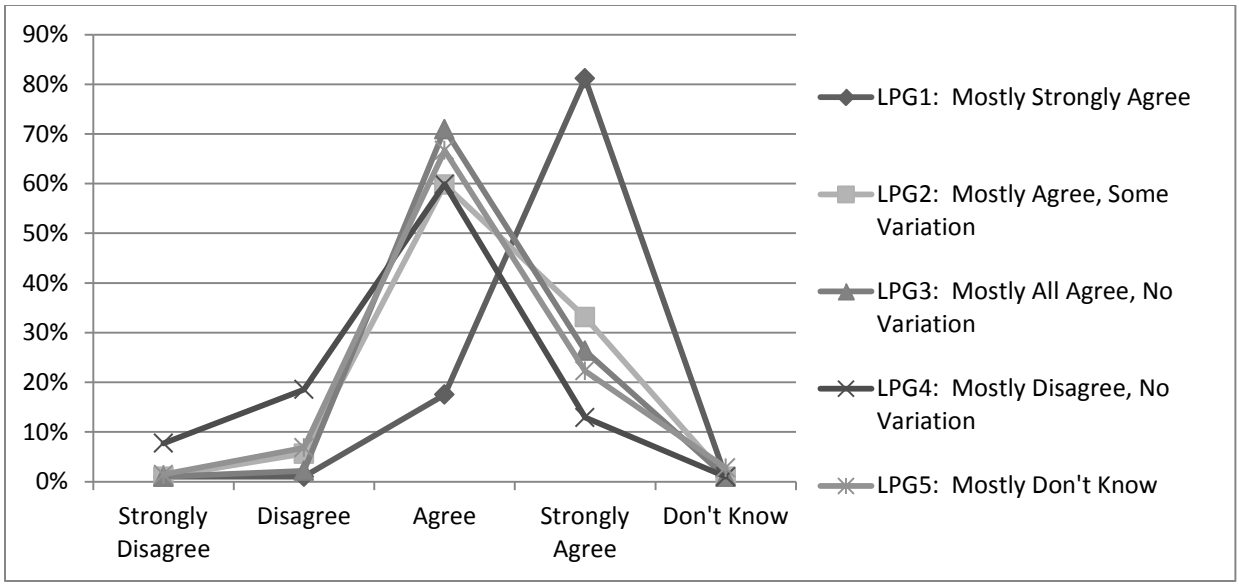
Percentage constitution of respondents across the full range of teaching experience categories, showing relatively consistent increase across increasing spreads of experience (with the exception of the "20+ year" category).

Figure 8. Years of experience as an educator.



Percentage constitution of respondents across the full range of teaching experience in current school, showing relatively consistent decrease after 6 years of experience in current school.

Figure 9. Total years in current school.



Percentage constitution of respondents across the Likert scale regarding working in a safe environment, showing consistent agreement or strong agreement, at 60% or greater for all LPGs, that work environments are safe.

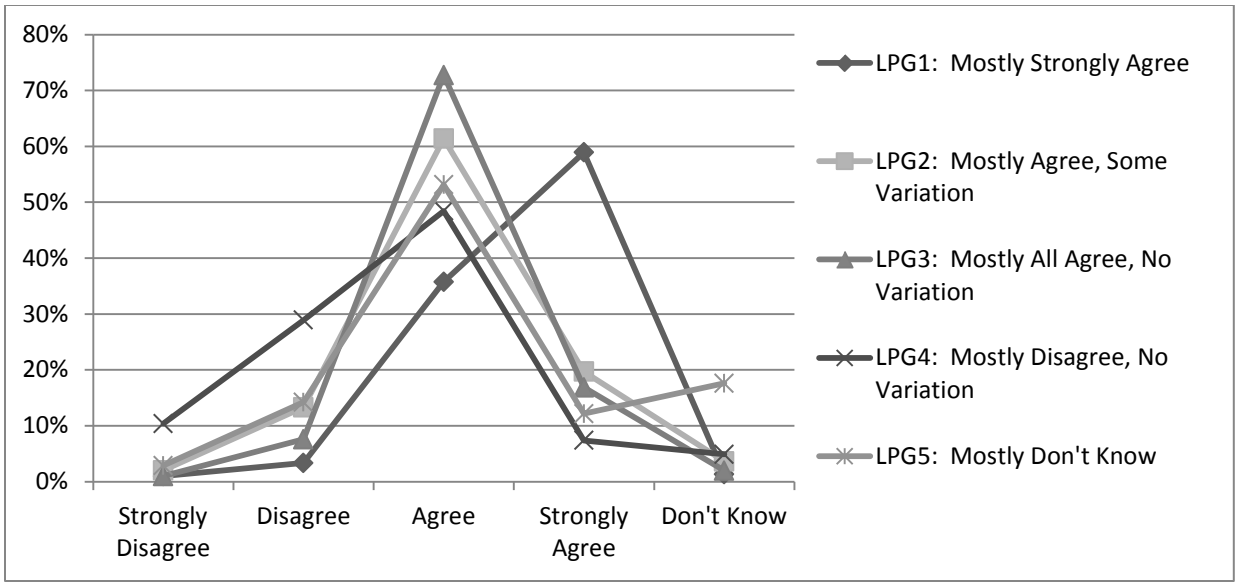
Figure 10. Safe working environment.

visually emphasizes respondents' level of satisfaction with the safety aspects of their teaching environments.

Supportive community. LPG1, LPG2, and LPG3 are mostly comprised of participants who responded positively to the components of Q7.3. When cross-tabulated with the question of community support for their school, respondents in LPG1, LPG2 and LPG3 indicate minimal disagreement regarding community support for their schools. Similar to the previous descriptor question, LPG4 respondents indicate the highest level of disagreement or strong disagreement with the survey item at 39.31% (see Table 14). The generic pattern of these data is again illustrated in Figure 11.

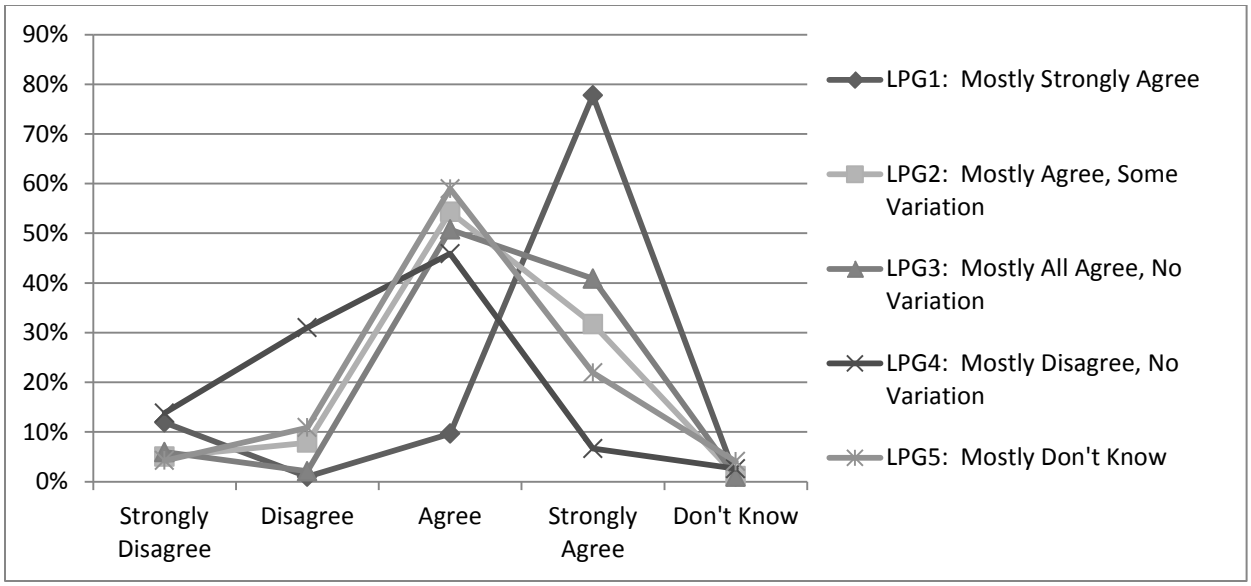
Overall satisfaction. Finally, question Q10.6, "Overall, my school is a good place to teach and learn," was cross-tabulated with the LPG groups. Table 15 indicates that approximately 12.89% of the LPG1, 12.87% of LPG2, and 8.03% of LPG3 respondents disagree or strongly disagree that their school is a good place to teach and learn. As with the previous two descriptor questions, the highest level of disagreement or strong disagreement can be found in LPG4 (44.82%) (see Figure 12). Conversely, 52.56% of LPG4 respondents, who mostly disagree that their school leadership addresses their concerns on the nine areas in Q7.3 (the basis upon which these respondents were clustered), still agree or strongly agree that their schools are good places to teach and learn. LPG4 consists of 12,097 respondents to this question, and 6,359 of them are in this category (see Table 15). These 6,359 of the 87,000 participants in the NC TWCS represent a small but noteworthy minority.

The line graph illustrating the responses to this question shows that LPGs 2 – 5 take roughly the same trajectory. All five LPGs have around 10% of their respondents that Strongly Disagree that their schools are good places to teach and learn. About 50% of LPGs 2-4 agree



Percentage constitution of respondents across the Likert scale regarding working in a supportive community, showing agreement or strong agreement, at 60% or greater, for all LPGs, that respondents work in supportive communities.

Figure 11. Supportive community.



Percentage constitution of respondents across the Likert scale regarding overall satisfaction in the workplace, showing agreement, at 45% or greater for all LPGs, that respondents believe their school is a good place to teach and learn.

Figure 12. Overall satisfaction.

that their schools are good places to teach and learn and all five LPGs have less than 5% of their respondents indicating that they don't know. LPG1 has the highest percentage of strong agreement and is clearly negatively skewed. According to Figure 7, LPG1 respondents have the highest percentage of experience in the 11-20 years of experience group and the 20+ years range. This LPG appears to feel safe in school, feels supported by the community and has a high level of overall satisfaction with their school.

These results give substance to two propositions. First, teachers can be satisfied with their school leadership's efforts to address their concerns in important areas of their profession and still not believe their school is a good place to teach and learn, and, second, teachers can be satisfied that their schools are good places to teach and learn even though their administrators do not address their concerns. It is in terms of these two propositions that a strong link to the school culture emerges. According to Deal and Peterson (1994) the role of school leaders in crafting the school culture is pervasive. Their words, their nonverbal messages, their actions, and their accomplishments all shape culture. NCSSE, Standard 3: Cultural Leadership (2011) states that the school executive must infuse the work of the adults and students with passion, meaning and purpose.

NC's Economic Tiers and the NC TWCS

The N.C. Department of Commerce ranks the state's 100 counties based on economic well-being and assigns each a Tier designation, 1-3 (NC Dept. of Commerce, 2012). According to the report *Highlights of the North Carolina Public School Budget* (2011), low-wealth LEAs (Tiers 1 and 2) receive additional funding from state and federal sources based on per-capita income, percentage of free- and reduced price-lunch students, and other pertinent demographic information. The North Carolina Department of Public Instruction also reported that Tier 1 and

2 LEAs received supplemental Low Wealth funding, as well as Small County supplemental funding based on average daily membership ("Highlights of the North Carolina," 2011). Title I of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 6301 et seq.) also provides supplemental funding to low-wealth LEAs to "ensure that all children have a fair, equal and significant opportunity to obtain a high-quality education and reach, at a minimum, proficiency on challenging State academic achievement standards and state academic assessments" (Sec 1001).

A series of five one-way analyses of variance (ANOVA) were conducted to evaluate the relationship between Economic Tier and the percentage of LPG1, LPG2, LPG3, LPG4, and LPG5 teacher membership (taken individually) across all the LEAs in the state. The independent variable (the Economic Tier) consisted of three levels (1, 2, or 3). The dependent variable was, in turn, the LPG1, LPG2, LPG3, LPG4, and LPG5 teacher membership percentages. The results are described her and summarized in Table 16.

For LPG1: The ANOVA was not significant, F (2, 1873) = 2.990, p = .051.

For LPG2: The ANOVA was significant, F (2, 1873) = 27.251, p < .001. The strength of the association between Economic Tier and LPG2 percentage, as assessed by η^2 was small, indicating that Economic Tier accounted for 2.82% of the variance of the LPG2 percentages.

For LPG3: The ANOVA was significant, F (2, 1873) = 44.569, p < .001. The strength of the association between Economic Tier and LPG3 percentage, as assessed by η^2 was medium, indicating that Economic Tier accounted for 4.54% of the variance of the LPG3 percentages.

For LPG4: The ANOVA was significant, F (2, 1873) = 4.844, p=.008. The strength of the association between Economic Tier and LPG4 percentage, as assessed by $\eta^2$was small, indicating that Economic Tier accounted for 0.51% of the variance of the LPG4 percentages.

Table 16

LPGs and Economic Tiers

LPG	Tier 1 N=399 Schools	Tier 2 N=626 Schools	Tier 3 N=851 Schools	ANOVA *p*-value
LPG1: Mostly Strongly Agree	16%	14%	14%	.051
LPG2: Mostly Agree with Some Variation	32%	35%	37%	<.001***
LPG3: All Agree, No Variation	36%	32%	29%	<.001***
LPG4: Mostly Disagree/Strongly Disagree	12%	13%	14%	.0080*
LPG5: Mostly Don't Know	5%	5%	6%	<.001***

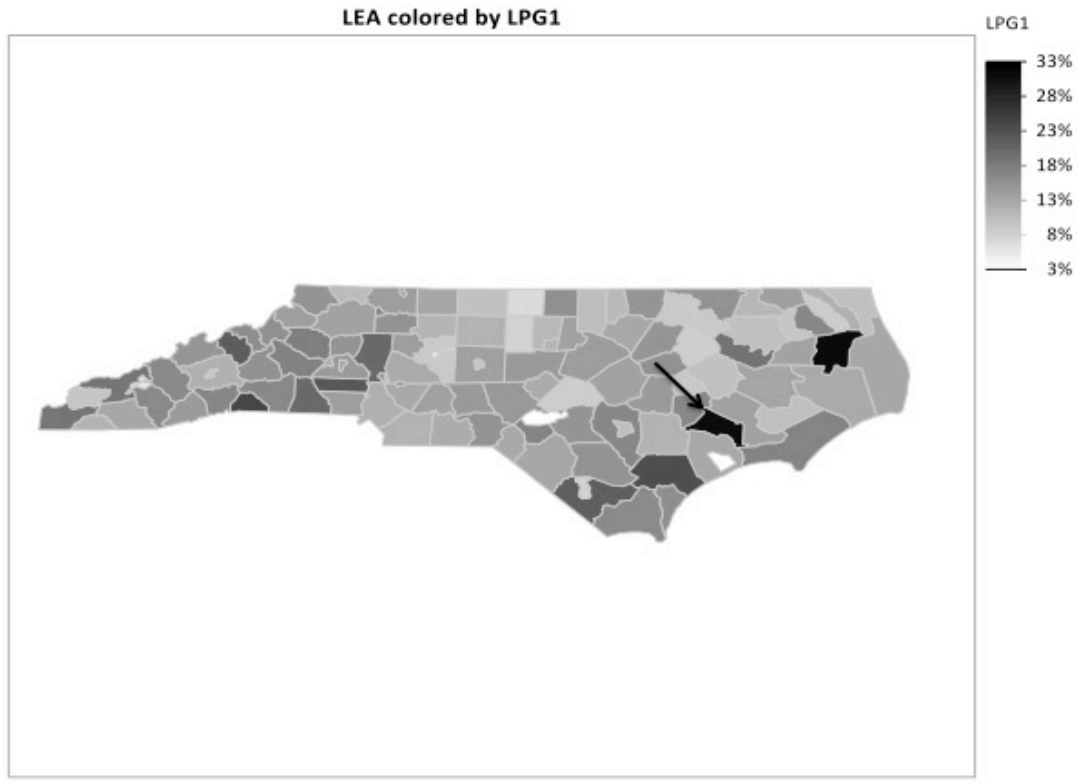
Note. *** p <.001.

For LPG5: The ANOVA was significant, F (2, 1873) = 12.832, $p < .001$. The strength of the association between Economic Tier and LPG5 percentage, as assessed by η^2 was small, indicating that Economic Tier accounted for 1.33% of the variance of the LPG5 percentages.

The ANOVA analysis along with consideration of effect size for each of the five LPGs indicate that there is association between economic tier and four of the five LPGs. Only LPG1 does not have a significant association with economic tier which suggests the possibility that experienced teachers (see Table 11) are less affected by outside factors like socio-economic status and have a greater level of overall satisfaction with their school and its leadership. This analysis confirms prior research as described in chapter 2. Therefore, in order to bring clarity to the discussion of the association between school culture on student achievement, economic tier was treated as a potentially confounding factor in a longitudinal regression analysis. By controlling for economic tier, the longitudinal regression provides a more focused look at school culture as it relates to student achievement in reading and math, grades three through eight.

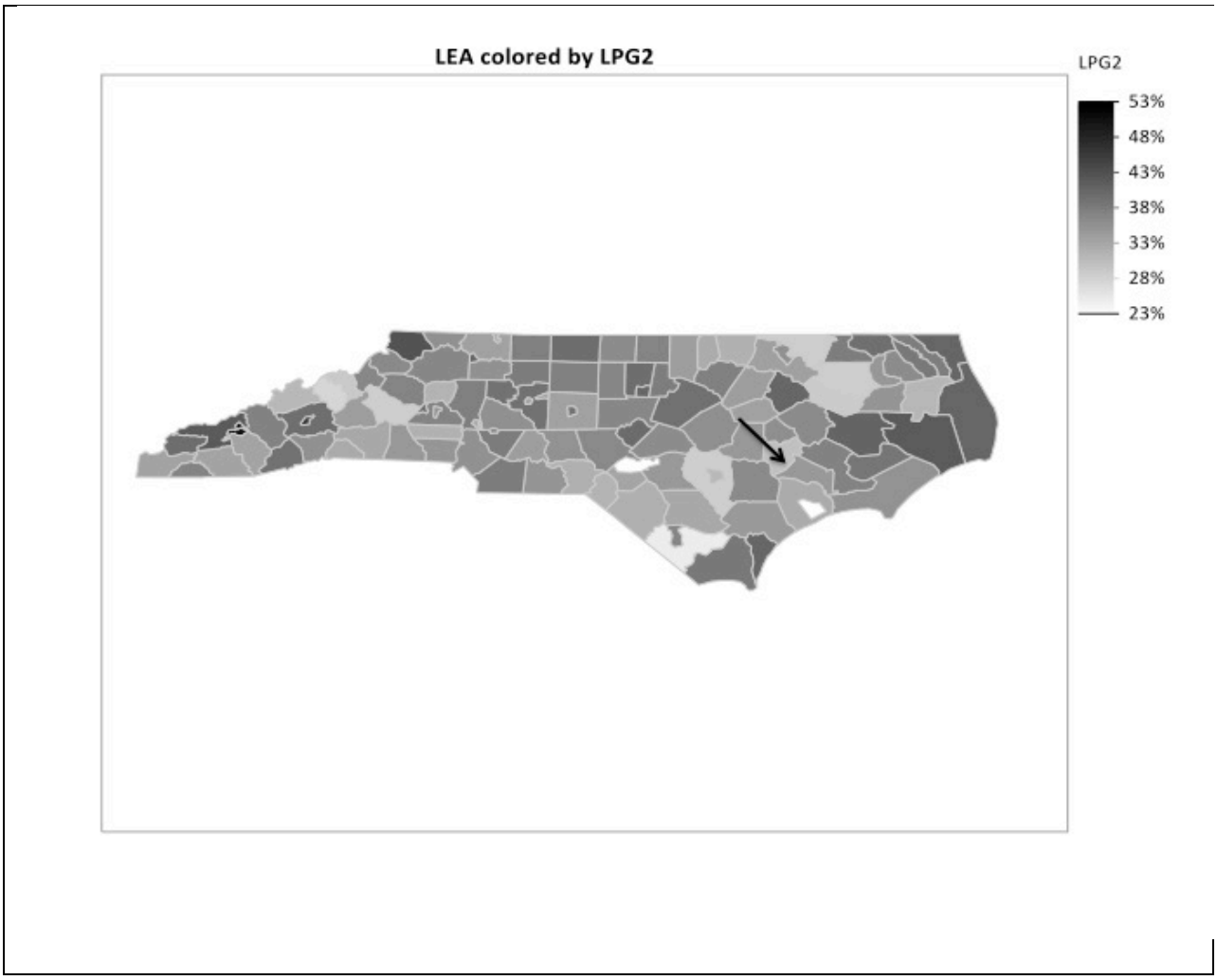
The five LPGs can be more deeply understood when explored at the LEA level. Appendix B shows the average percentage of teachers in each LEA who report their satisfaction with school leadership according to the LPG characteristics and can be accessed at the end of this report.

The maps (see Figures 13 - 17) that follow offer visual representation of the concentration of teachers reporting their satisfaction on Q7.3, according to the characteristics of the five LPGs. Each map depicts one LPG and then, through shading gradation, indicates the LEAs with the most intense concentration of schools where teachers can be identified with that LPG. Each map shows two LEAs in white, which correspond to Department of Defense



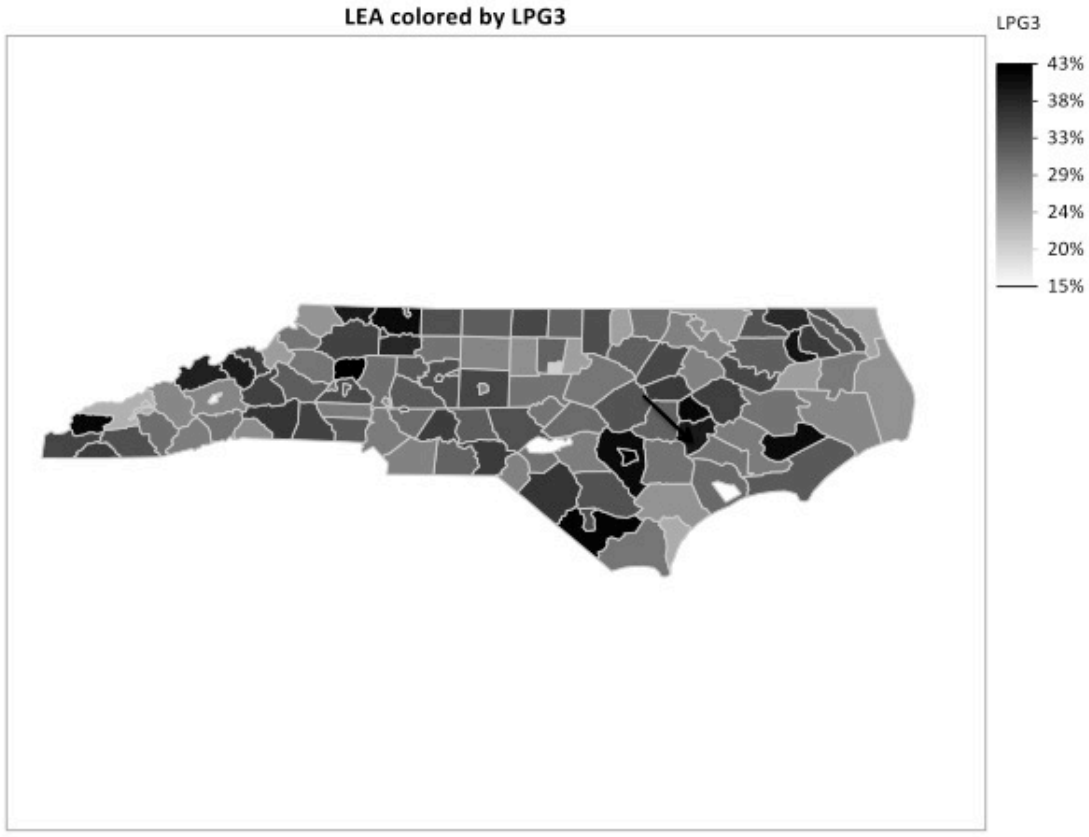
Map indicates the concentration of LPG1 in each of the counties/LEAs in North Carolina. LEA 520, Jones County, is indicated by the black arrow.

Figure 13. LEA colored by LPG1.



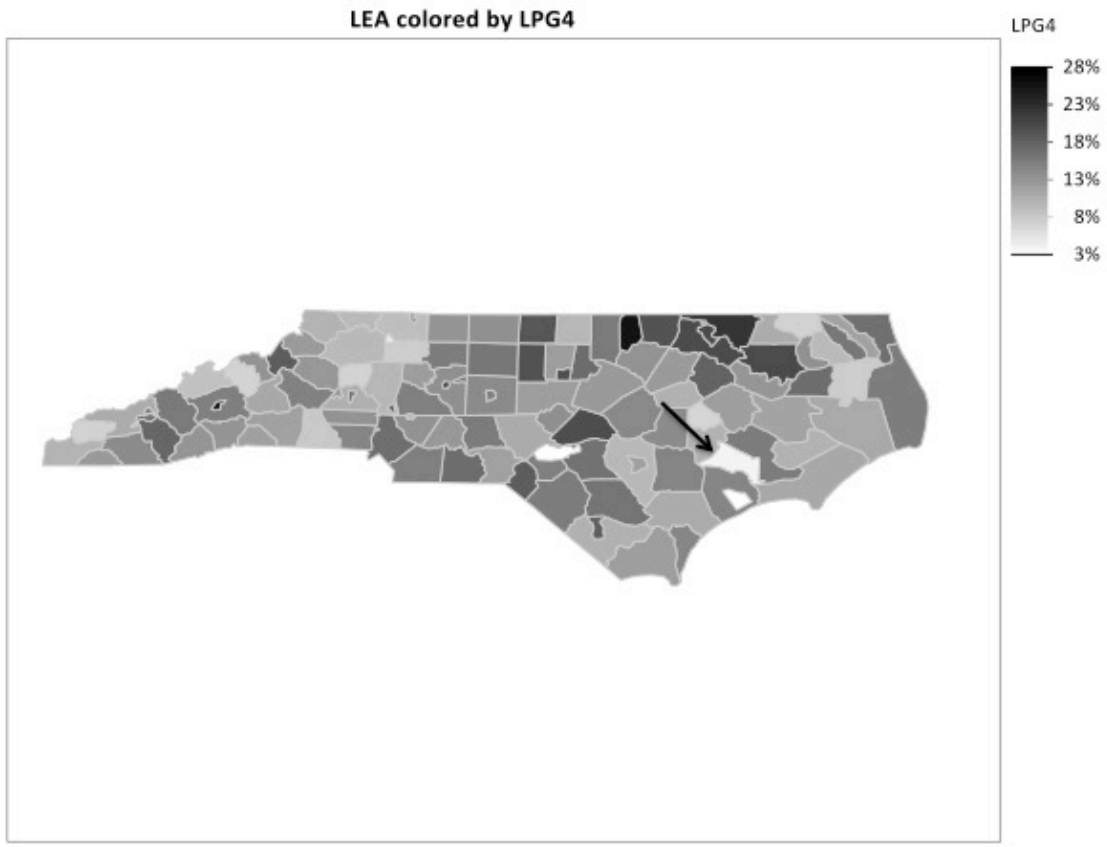
Map indicates the concentration of LPG2 in each of the counties/LEAs in North Carolina. LEA 520, Jones County, is indicated by the black arrow.

Figure 14. LEA colored by LPG2.



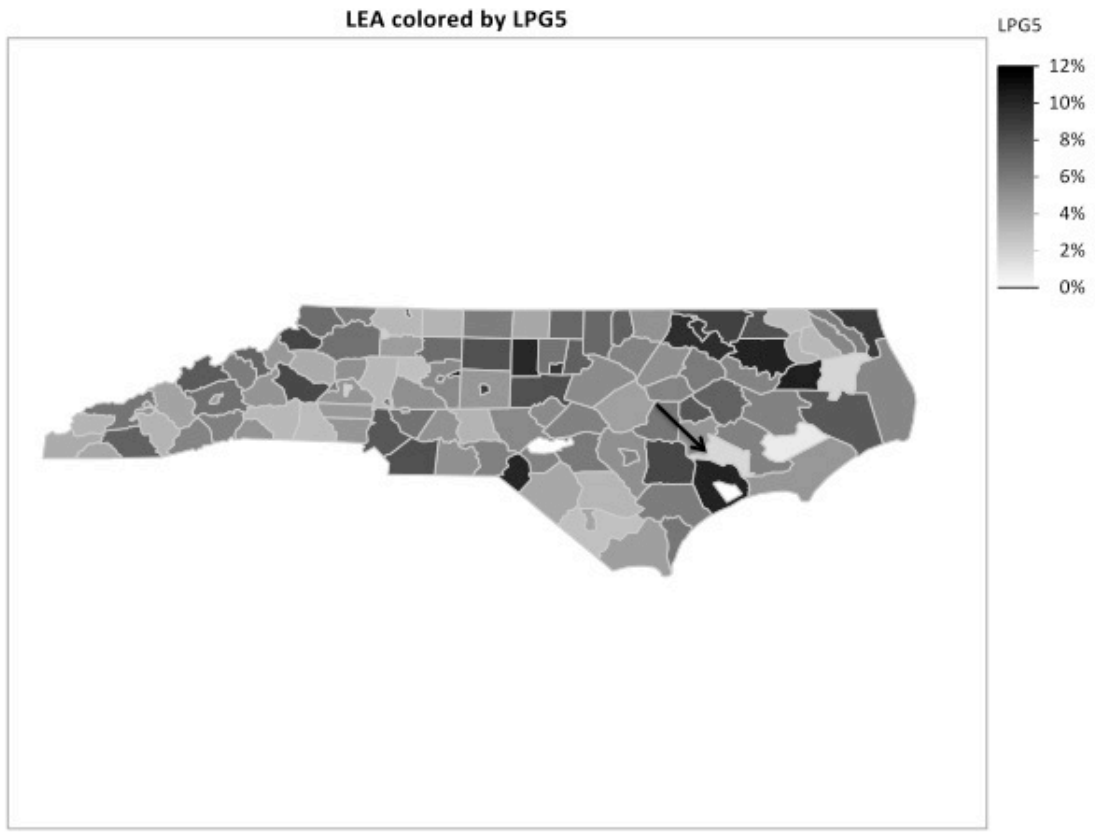
Map indicates the concentration of LPG3 in each of the counties/LEAs in North Carolina. LEA 520, Jones County, is indicated by the black arrow.

Figure 15. LEA colored by LPG3.



Map indicates the concentration of LPG4 in each of the counties/LEAs in North Carolina. LEA 520, Jones County, is indicated by the black arrow.

Figure 16. LEA colored by LPG4.



Map indicates the concentration of LPG1 in each of the counties/LEAs in North Carolina. LEA 520, Jones County, is indicated by the black arrow.

Figure 17. LEA colored by LPG5.

districts, Camp Lejeune near the coast and Fort Bragg schools in the southern central portion of NC. Data are not available for those LEAs.

As an example, LEA 520, Jones County Schools, indicated by the black arrows on each map, is dark gray on the map in Figure 13 that shows LPG1: Mostly Strongly Agrees. The black indicates that approximately 33% of the schools in Jones County have a high concentration of LPG1 teachers, those who mostly believe that their school leadership does make a sustained effort to address teacher concerns in each of the nine areas in Q7.3. In Figure 14 that shows LPG2: Mostly Agree with Some Variation, LEA 520 is medium gray. For LPG2 that represents about 37% of schools. The map for LPG3 (see Figure 15): All Agree, No Variation, LEA 520 is light gray indicating that about 30 % of schools have high concentrations of teachers who answered Agree to all questions. Figure 16, LPG4: Mostly Disagree and Strongly Disagree, LEA 520 is white or at the bottom of the range with only 3% of schools reporting strong disagreement. Finally, Figure 17 which shows the map for LPG5: Mostly Don't Know, shows LEA 520 in very light gray indicating that none of the schools in Jones County strongly reported that they did not know whether school leadership makes a sustained effort to address teachers' concerns about the nine areas listed in Q7.

2012 NC Student Achievement Data

In order to understand what teachers' attitudes and perceptions, as measured by the NC TWCS, might have to do with the academic success of a school, it is helpful to explore the achievement data for their schools and LEAs. For this study, North Carolina End-of-Grade test results for the same year, 2012, as the NC TWCS results were used. Data from both sources were compared at the school and LEA level to determine the association between teachers' attitudes and perceptions of the school's leadership and the academic performance of the

students in those schools and LEAs. Two of the descriptor questions from the NC TWCS, years of experience and years of employment in the current school, were used to further identify factors that potentially impact teacher attitude and student performance.

Testing data were available for each school and each LEA in North Carolina by grade, subject and several demographic classifications. The outcomes data chart (see Table 17) presents aggregate data for grades 3-8 in Reading and Math for the nearly 2,400 schools in North Carolina serving grades 3 through 8. In all, there are 45,443 observations across all grades and tests. The chart includes the number of schools at each grade level that administered the assessments and for which scores are available.

The NC Department of Public Instruction's Accountability Division reports a great deal of descriptive information with annual test data including race and ethnicity, students with disabilities, and percentages at each achievement level, 1-4. For this study, student achievement was used for whole-group proficiency in reading and in math for third grade through eighth grade, at the school and LEA level. Adjustments were made for teacher years of experience, years of employment in the current school, and economic tier of the LEA through least squares means and reported in the final analysis.

Achievement Data and NC Economic Tiers

The association between economic tiers and teachers' responses relative to the LPGs has been validated in this study (see Table 18), the tiers were also used as a means of understanding the achievement data. Table 18 shows the mean proficiency percentages by LEA within economic tier for all of the LEAs in North Carolina. An effect test was conducted to determine whether each variable in the model, in this case economic tier, had a significant association with student achievement. Probability values for the effect test can be found in the output table in

Table 17

2012 End-of-Grade Tests, Reading and Math, Grades 3-8

Subject	Grade	N (schools)	Mean % Proficient	Std Dev
Reading	3	1524	68	15
	4	1529	70	15
	5	1501	71	14
	6	836	73	16
	7	806	65	18
	8	816	67	17
Math	3	1524	82	11
	4	1529	84	11
	5	1500	81	12
	6	836	78	15
	7	806	77	17
	8	816	81	18

Table 18

Mean Student Percent Proficiency in Mathematics (Math) and Reading (Read) by Economic Tier of LEA

		Tier 1		Tier 2		Tier 3	
Subject	Grade	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Math	3	79.13	12.15	81.28	10.87	82.68	11.31
Math	4	82.61	10.78	83.8	10.71	84.28	11.93
Math	5	78.79	12.6	80.59	11.44	82.71	11.59
Math	6	76.05	13.9	77.59	15.79	76.75	17.43
Math	7	74.37	18.16	76.17	17.69	76.65	18.86
MA	8	78.18	17.98	79.2	19.42	81.04	18.27
Read	3	64.74	14.32	66.22	13.1	69.03	15.87
Read	4	68.09	14.07	69.98	12.83	71.34	16.04
Read	5	67.85	14.08	70.66	12.84	72.88	14.93
Read	6	70.02	13.97	72.52	14.92	72.3	18.26
Read	7	59.19	17.92	63.68	15.63	65.21	19.48
Read	8	62.89	16.56	66.31	16.34	67.95	18.76

Appendix A. In the final analysis, longitudinal regression, adjustments were made for teachers' experience, length of time in the school, and economic tier and statistical significance of the association between the NC TWCS LPGs and student achievement was determined.

Analysis of NC TWCS and Achievement Data

Data from the NC TWCS are reported at the teacher level, by school and by LEA. This rich data source allows for a close look at the perceptions of teachers across the state regarding the nine issues described in NC TWCS Q7.3 (2012). Comparing the NC TWCS data, which are individual teacher/respondent data associated with school and LEA, to the results from NC End-of-Grade tests, which are only reported at the school and LEA level, requires that the NC TWCS data be scaled up from the teacher/respondent level to match the NC EOG data for third through eight grades, reading and math. This was accomplished by matching each teachers' LPG with his or her school, effectively creating five indicators that measure the school's culture for each school site – LPG1, LPG2, LPG3, LPG4, and LPG5 - each teacher falls into one and only one of the LPGs.

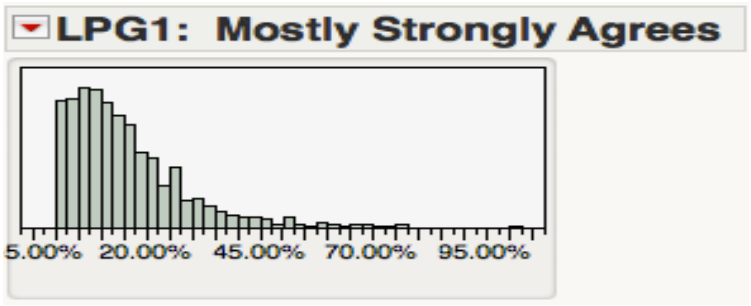
As explained in chapter 3, in order to focus on the association between each LPG and the achievement data, a median split was performed on each LPG. Median splits are useful in that they can separate data into two equal sized groups for broad comparison purposes. Since the number of respondents in each LPG varies, as well as levels of agreement within the cluster group, the percentages at which the median splits occur in the 5 LPGs vary. For example, the median split for LPG1 occurs at 12%. Figure 13 shows that the data for LPG1 as it falls along a continuum for all of the LEAs in the state. As shown, half of the LPG1 is constrained at the 0-12% group while the remaining 50% of the LPG runs from 12% all the way to 100%. Therefore, the median split level of 12% is used to designate a high or low concentration of teachers in

LPG1. Histograms depicting the continuum for each LPG is included in Figure 18. The legend for each histogram includes the quantiles and the median for each LPG.

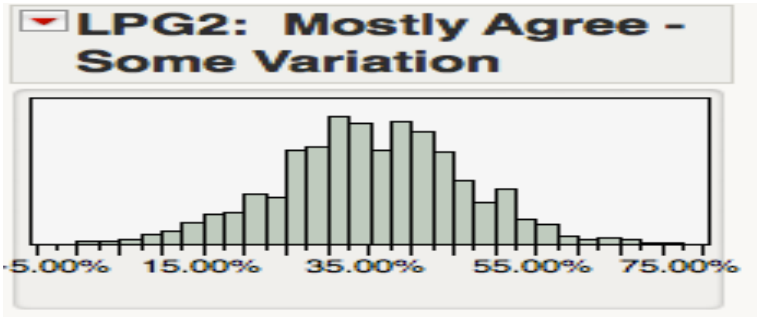
Table 19 shows the median split level for each LPG. For example, the median split for LPG1: Mostly Strongly Agree is 12%. Therefore, a school with greater than 12% of its teachers in LPG1 could be considered to have a high concentration of LPG1 teachers.

The NC TWCS data, aggregated at the LPG level, was studied to determine the effects of the groupings on each school's performance and on the academic achievement of the LEA, as a whole. To create a model that could be easily analyzed and understood, each LPG was split at the median and coded 0 for schools having a smaller concentration of teachers in the particular LPG and 1 for schools with a high concentration of teachers in the LPG. T-tests were used to compare percent proficient in reading and math, third through eighth grade for the high and low concentration groups. Table 20 illustrates the results of comparing the high and low ends of the median split groupings to student achievement. For example, Table 20 shows that in fourth grade math, schools with high concentrations of teachers who fall into LPG1, Mostly Strongly Agree, score on the NC EOG test at an average 84.86% proficiency while schools with low concentrations of teachers in LPG1 score lower, at 82.55% proficiency. Following fourth grade math, Table 20 shows that schools with a low concentration of teachers in LPG4, Mostly Disagree, average around 85.34%, while schools with a high concentration of teachers in LPG4 fare worse at 81.96% proficient. The difference of 3.38% is significant ($p<.05$).

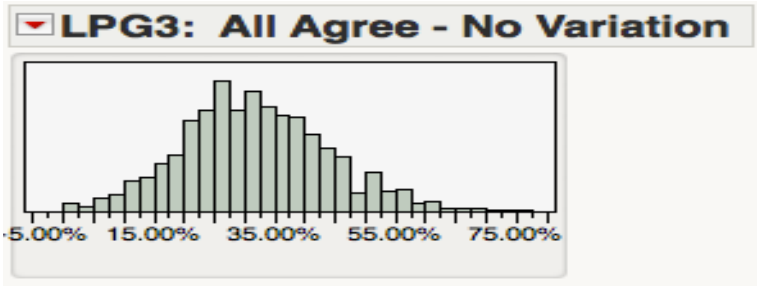
A longitudinal regression model was used to study the units of measure, which are school and LEA, through each of the median–split groupings. Least squares means, which are the group means after having controlled for covariates, were used compare percent proficient in reading



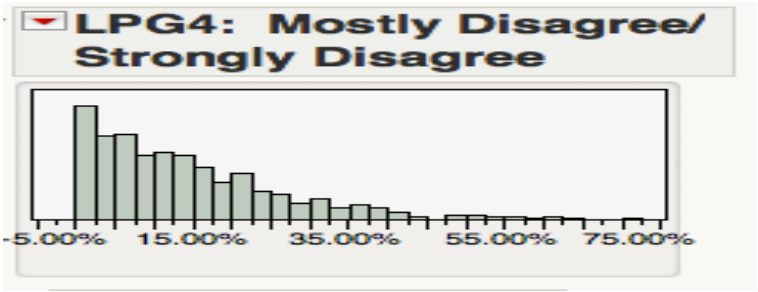
LPG 1 Quantiles		
100.0%	maximum	1
99.5%		0.66667
97.5%		0.45455
90.0%		0.3
75.0%	quartile	0.2
50.0%	median	0.11905
25.0%	quartile	0.06122
10.0%		0.025
2.5%		0
0.5%		0
0.0%	minimum	0



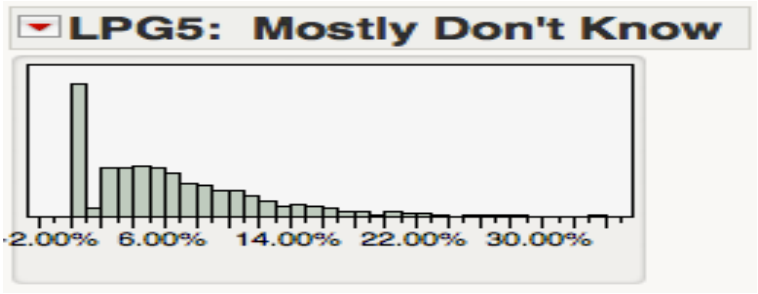
LPG2 Quantiles		
100.0%	maximum	0.71429
99.5%		0.63158
97.5%		0.55814
90.0%		0.48718
75.0%	quartile	0.42308
50.0%	median	0.34884
25.0%	quartile	0.28
10.0%		0.21053
2.5%		0.125
0.5%		0.06061
0.0%	minimum	0



LPG3 Quantiles		
100.0%	maximum	0.75
99.5%		0.64706
97.5%		0.56
90.0%		0.47059
75.0%	quartile	0.39024
50.0%	median	0.3125
25.0%	quartile	0.23404
10.0%		0.16667
2.5%		0.09259
0.5%		0
0.0%	minimum	0



LPG4 Quantiles		
100.0%	maximum	0.7
99.5%		0.525
97.5%		0.39286
90.0%		0.29268
75.0%	quartile	0.19512
50.0%	median	0.11111
25.0%	quartile	0.04762
10.0%		0
2.5%		0
0.5%		0
0.0%	minimum	0



LPG5 Quantiles		
100.0%	maximum	0.33333
99.5%		0.22222
97.5%		0.17391
90.0%		0.125
75.0%	quartile	0.08642
50.0%	median	0.05
25.0%	quartile	0.02128
10.0%		0
2.5%		0
0.5%		0
0.0%	minimum	0

Figure 18. LPGs distributed along a continuum.

Table 19

Median Levels for LPGs

LPG	Median	High Concentration	Low Concentration
LPG1: Mostly Strongly Agrees	12%	≥12%	<12%
LPG2: Mostly Agree - Some Variation	35%	≥35%	<35%
LPG3: All Agree - No Variation	31%	≥31%	<31%
LPG4: Mostly Disagree, Some Strongly Disagree	11%	≥11%	<11%
LPG5: Mostly Don't Know	5%	≥5%	<5%

Table 20

LPG Median Split Table – No Adjustment (Inference from Standard t-test)

LPG1: Mostly Strongly Agree Median Split

Subj	Grade	High LPG % Prof Mean	Std Dev	Low LPG % Prof. Mean	Std Dev	t-Statistic	*p* Value	Subj	Grade	High LPG % Prof Mean	Std Dev	Low LPG % Prof Mean	Std Dev	t-Statistic	*p* Value
MA	3	83.06	11.36	79.72	11.23	-5.36	<.05*	RD	3	69.43	14.58	64.69	14.62	-5.87	<.05*
MA	4	84.86	11.87	82.55	10.55	-3.74	<.05*	RD	4	72.24	14.67	67.94	14.39	-5.37	<.05*
MA	5	82.7	11.79	79.57	11.7	-4.77	<.05*	RD	5	73.16	14.02	68.87	14.1	-5.48	<.05*
MA	6	76.96	18.16	76.82	13.99	.11	.916	RD	6	72.6	17.41	71.09	15.1	-1.16	.246
MA	7	75.59	20.38	76.36	16.24	.497	.619	RD	7	63.8	19.59	62.89	16.76	-.603	.546
MA	8	78.25	21.01	80.99	16.32	1.76	.079	RD	8	66.05	18.82	66.31	16.49	.179	.857

LPG2: Mostly Agree – Some Variation Median Split

Subj	Grade	Mean	Std Dev	Mean	Std Dev	t-Statistic	*p* Value	Subj	Grade	Mean	Std Dev	Mean	Std Dev	t-Statistic	*p* Value
MA	3	81.05	10.95	81.9	11.82	1.343	.179	RD	3	66.81	14.55	67.57	15	.935	.349
MA	4	82.95	11.84	84.56	10.76	2.586	<.05*	RD	4	69.16	15.03	71.21	14.3	2.532	<.05*
MA	5	80.46	12.45	81.94	11.19	2.238	<.05*	RD	5	70.27	14.67	71.94	13.71	2.115	<.05*
MA	6	77.19	15.41	76.55	16.78	-.499	.617	RD	6	71.2	16.23	72.45	16.22	.971	.331
MA	7	76.28	17.19	75.72	19.26	-.373	.709	RD	7	63.52	17.03	63.02	19.2	-.336	.736
MA	8	79.61	18.13	79.97	19.12	.236	.813	RD	8	66.27	16.79	66.12	18.42	-.104	.916

Table 20 (continued)

LPG3: All Agree – No Variation Median Split

Subj	Grade	High LPG % Prof Mean	Std Dev	Low LPG % Prof. Mean	Std Dev	t-Statistic	*p* Value	Subj	Grade	High LPG % Prof Mean	Std Dev	Low LPG % Prof Mean	Std Dev	t-Statistic	*p* Value
MA	3	82.41	10.72	80.47	12.07	-3.067	<.05*	RD	3	68.28	13.84	66.01	15.69	-2.77	<.05*
MA	4	84.94	9.87	82.5	12.61	-3.892	<.05*	RD	4	71.44	13.31	68.86	15.98	-3.17	<.05*
MA	5	82.44	10.56	79.89	12.97	-3.851	<.05*	RD	5	72.39	13	69.74	15.3	-3.35	<.05*
MA	6	77.94	15.52	76.03	16.47	-1.496	.135	RD	6	73.46	15.03	70.45	17.04	-2.34	<.05*
MA	7	77.45	18.85	74.99	17.61	-1.623	.105	RD	7	64.8	18.78	62.2	17.46	-1.72	.085
MA	8	80.38	19.07	79.33	18.23	.681	.496	RD	8	67.77	17.66	65.05	17.4	11.88	.060

LPG4: Mostly Disagree, Some Strongly Disagree Median Split

Subj	Grade	Mean	Std Dev	Mean	Std Dev	t-Statistic	*p* Value	Subj	Grade	Mean	Std Dev	Mean	Std Dev	t-Statistic	*p* Value
MA	3	79.3	11.89	83.35	10.66	6.462	<.05*	RD	3	64.24	15.12	69.72	14.02	6.764	<.05*
MA	4	81.96	11.18	85.34	11.22	5.467	<.05*	RD	4	67.22	15.09	72.78	13.84	6.938	<.05*
MA	5	78.88	12.29	83.26	11.06	6.707	<.05*	RD	5	68.02	14.5	73.84	13.38	7.471	<.05*
MA	6	75.68	15.36	78.52	16.88	2.166	<.05*	RD	6	70.22	15.98	73.94	16.34	2.847	<.05*
MA	7	74.67	17.8	77.97	18.55	2.186	<.05*	RD	7	61.57	17.88	65.77	18.06	2.812	<.05*
MA	8	79.16	17.78	80.66	19.68	.960	.337	RD	8	64.76	17.43	68.26	17.54	2.426	<.05*

Table 20 (continued)

LPG5: Mostly Don't Know Median Split

Subj	Grade	High LPG % Prof Mean	Std Dev	Low LPG % Prof. Mean	Std Dev	t-Statistic	*p* Value	Subj	Grade	High LPG % Prof Mean	Std Dev	Low LPG % Prof Mean	Std Dev	t-Statistic	*p* Value
MA	3	79.69	11.88	82.82	10.88	4.895	<.05*	RD	3	64.5	15.47	69.21	13.93	5.690	<.05*
MA	4	82.08	12.31	85.02	10.37	4.585	<.05*	RD	4	67.71	15.38	72.05	13.89	5.278	<.05*
MA	5	79.67	12.51	82.35	11.2	3.981	<.05*	RD	5	68.85	15.02	72.78	13.35	4.871	<.05*
MA	6	76.76	15.13	77	16.87	0.189	.846	RD	6	71.53	16.09	72.04	16.37	.392	.694
MA	7	76.31	17.54	75.75	18.75	-.373	.708	RD	7	63.21	17.91	63.37	18.22	.111	.911
MA	8	80.08	17.88	79.49	19.23	-.392	.695	RD	8	65.9	17.64	66.47	17.48	.397	.691

and math, third through eighth grade adjusted for the confounding factors, which were economic tiers, teachers' experience in the profession and in their current schools. The tables that follow include the *p*-values after adjusting for the confounding factors in the model. The charts are grade and subject specific relative to percent proficiency on the 2012 NC EOG tests.

Table 21 indicates that the LPGs have a significant effect on the outcome data, NC EOG test results, in reading and math. Specifically, the effect of LPG4, Mostly Disagree, Some Strongly Disagree, is significant in third through eighth grade in both reading and math. LPG4 consists of about 12,155 teachers or 13.88% of the respondents on the 2012 NC TWCS. LPG5, the smallest grouping with 5,382 teachers or 6.15% of respondents, Mostly Don't Know, had a significant association with test results in third, fourth and fifth grade reading and math. LPG1, 11,644 respondents, 13.3%, significantly affected third grade reading and math and LPG2, the largest grouping with 31,530 respondents, 36%, significantly affected fourth grade reading and math.

Notable in the comparison of Table 20 and Table 21 are the median split LPGs that have significant association in Table 20 (no adjustment) and sustain the significant association in Table 21 after adjustments for the confounding factors have been made. For example, the association of the LPG1 median split groups with proficiency in math and reading, third through fifth grade, is significant before adjustments. After adjusting for the teachers' experience, year is in the current school and economic tier, school culture (LPG1) only affects reading and math in third grade and eighth grade math. The effects of LPG2 on reading and math were stable before and after the adjustments were made and were determined to be present in fourth grade reading and math only.

Table 21

Median Split Table – Adjusted Means and Adjusted Standard Errors (Inference from Type 3 Analysis)

LPG1: Mostly Strongly Agree Median Split

Subj	Grade	High LPG1 % Proficient Mean	High Group Std Error	Low LPG1 % Proficient Mean	Low Group Std Error	*p* Value	Subj	Grade	High LPG1 % Proficient Mean	High Group Std Error	Low LPG1 % Proficient Mean	Low Group Std Error	*p* Value
MA	3	81.31	0.64	79.74	0.64	<.05*	RD	3	66.77	0.81	64.78	0.80	<.05*
MA	4	83.11	0.61	83.04	0.61	.928	RD	4	69.30	0.82	68.49	0.82	.339
MA	5	80.43	0.68	79.51	0.68	.194	RD	5	70.25	0.79	69.00	0.79	.126
MA	6	76.45	1.06	77.14	1.01	.629	RD	6	71.53	1.07	72.09	1.06	.690
MA	7	75.28	1.16	76.38	1.11	.503	RD	7	62.62	1.23	63.33	1.18	.652
MA	8	77.74	1.23	81.15	1.19	<.05	RD	8	65.22	1.18	66.97	1.14	.260

Table 21 (continued)

LPG2: Mostly Agree-Some Variation Median Split

		High LPG2 % Proficient		Low LPG2 %Proficient					High LPG2 % Proficient		Low LPG2 % Proficient		
Subj	Grade	Mean	High Group Std Error	Mean	Low Group Std Error	*p* Value	Subj	Grade	Mean	High Group Std Error	Mean	Low Group Std Error	*p* Value
MA	3	80.27	0.63	80.78	0.61	.427	RD	3	65.62	0.80	65.93	0.78	.696
MA	4	82.42	0.61	83.72	0.59	<.05*	RD	4	68.05	0.81	69.74	0.79	<.05*
MA	5	79.34	0.67	80.59	0.66	.060	RD	5	68.95	0.78	70.30	0.77	.075
MA	6	77.14	0.99	76.45	0.98	.609	RD	6	71.43	1.04	72.19	1.04	.565
MA	7	76.22	1.11	75.44	1.10	.613	RD	7	63.43	1.18	62.52	1.18	.552
MA	8	78.85	1.18	80.03	1.18	.466	RD	8	66.21	1.13	65.98	1.13	.873

Table 21 (continued)

LPG3: All Agree, No Variation Median Split

Subj	Grade	High LPG3 % Proficient Mean	High Group Std Error	Low LPG3 % Proficient Mean	Low Group Std Error	*p* Value	Subj	Grade	High LPG3 % Proficient Mean	High Group Std Error	Low LPG3 % Proficient Mean	Low Group Std Error	*p* Value
MA	3	80.93	0.63	80.11	0.63	.201	RD	3	66.17	0.79	65.38	0.80	.330
MA	4	83.59	0.60	82.56	0.61	.133	RD	4	69.07	0.81	68.72	0.81	.674
MA	5	80.45	0.67	79.48	0.67	.158	RD	5	69.87	0.78	69.38	0.78	.532
MA	6	76.43	1.03	76.63	1.00	.81	RD	6	72.26	1.08	71.36	1.05	.517
MA	7	76.76	1.17	74.91	1.10	.265	RD	7	63.90	1.24	62.05	1.17	.249
MA	8	79.49	1.25	79.40	1.17	.959	RD	8	66.80	1.20	65.39	1.12	.366

Table 21 (continued)

LPG4: Mostly Disagree, Some Strongly Disagree Median Split

		High LPG4 % Proficient		LowLPG4 % Proficient					High LPG4 % Proficient		Low LPG4 % Proficient		
Subj	Grade	Mean	High Group Std Error	Mean	Low Group Std Error	*p* Value	Subj	Grade	Mean	High Group Std Error	Mean	Low Group Std Error	*p* Value
MA	3	79.57	0.65	81.48	0.63	<.05*	RD	3	64.47	0.81	67.08	8.80	<.05*
MA	4	82.23	0.62	83.91	0.61	<.05*	RD	4	67.44	0.83	70.35	0.82	<.05*
MA	5	79.02	0.68	80.91	0.67	<.05*	RD	5	68.16	0.80	71.11	0.79	<.05*
MA	6	75.31	0.98	78.29	1.07	<.05*	RD	6	70.24	1.04	73.38	1.11	<.05*
MA	7	74.05	1.09	77.61	1.19	<.05*	RD	7	61.00	1.18	64.95	1.25	<.05*
MA	8	77.78	1.17	81.11	1.27	<.05*	RD	8	58.09	1.13	64.10	1.21	<.05*

Table 21 (continued)

LPG5: Mostly Don't Know Median Split

Subj	Grade	High LPG5 % Proficient Mean	High Group Std Error	Low LPG5 % Proficient Mean	Low Group Std Error	*p* Value	Subj	Grade	High LPG5 % Proficient Mean	High Group Std Error	Low LPG5 % Proficient Mean	Low Group Std Error	*p* Value
MA	3	79.57	0.64	81.49	0.60	<.05*	RD	3	64.34	0.80	67.21	0.75	<.05*
MA	4	82.02	0.61	84.13	0.56	<.05*	RD	4	67.57	0.82	70.22	0.77	<.05*
MA	5	79.12	0.68	80.81	0.64	<.05*	RD	5	68.42	0.79	70.84	0.75	<.05*
MA	6	77.18	1.00	76.41	0.92	.546	RD	6	71.88	1.05	71.74	0.98	.911
MA	7	76.37	1.11	75.29	1.02	.459	RD	7	62.93	1.19	63.02	1.11	.946
MA	8	79.60	1.19	79.30	1.10	.842	RD	8	65.93	1.14	66.26	1.07	.811

LPG4 (Mostly Disagree, Some Strongly Disagree) has a significant association with student achievement at all grades, reading and math, prior to adjusting for confounding factors. After the adjustment, significance is still present in all grades, reading and math. For example, in a school or an LEA with high concentration of LPG4 teachers (>11%), after adjusting for the confounding factors, the percent proficient in reading may be as much as 6% lower than in schools or LEAs with a low concentration of LPG4 teachers. Similar results are present for LPG5 (Mostly Don't Know) for reading and math, grades 3-5. Significant association between school culture (LPG5) and student achievement was sustained before and after adjustments were made. Proficiency in fourth grade reading may be as much as 2.65% less in schools or LEAs with a high concentration (>5%) of LPG5 teachers.

A full set of the results of the longitudinal regression model is in Appendix A of this document.

Summary of Findings

Based on the literature regarding school culture, Q7.3 of the NCTWC is a good proxy for school culture for this study. The nine components of Q7.3 represent the definitions of school culture, as well as the practices associated with school culture in the NCSSE (2011). Results were tabulated based on the Likert scale from Strongly Disagree to Disagree to Agree to Strongly Agree to Don't Know.

To gain a deeper understanding of the results, cluster analysis was used to group respondents. Hierarchical clustering created five Leadership Perception Groupings (LPGs) consisting of participants who are more similar to each other than to other participants based on their responses to Q7.3 of the NC TWCS. LPG1: Most Strongly Agree is about 13.3% of the data set. LPG1 includes the highest percentage of teachers with 11-20 years of experience (see

Table 11). LPG2: Mostly Agree, Some Strongly Agree is the largest grouping with about 36% of the participants (see Table 5). LPG3: All Agree, No Variation is about 30% of the participants. These participants marked their surveys "Agree" to every question. LPG4: Mostly Disagree, Some Strongly Disagree comprises about 14% of the participants (see Table 5), and LPG5: Mostly Don't Know is about 6% of the participants.

In order to get to the effect of culture, as represented by the clustered respondents to Q7.3 of the NC TWCS, three confounding factors were considered: teachers' experience in the profession, length of time teaching in current school and economic tier of the LEA. Experience and years teaching in the current school were self-reported by the teachers. Economic tier of the LEA was gleaned from the NC Commerce Department report, *2011 County Tier Designations* ("NC Dept.," 30). ANOVA testing suggested that economic tier was significantly related to all the LPGs except LPG1 (see Table 16). Tables 11 and 12 show the association between years of experience, years in current school and LPG.

To better understand the connection between the LPGs and student achievement, each LPG was split at the median concentration across schools into two groups – high concentrations of the particular LPG (above the median) and low concentration of the LPG (below the median). When applied at the school level, the median split revealed that schools with high concentrations of LPG1, or teachers that believe their school leadership addresses their concerns, have higher proficiency percentages in reading and math than schools with lo concentrations. Conversely, schools with high concentrations of teachers in LPG4: Mostly Disagree, Some Strongly Disagree seem to have lower percentages of proficiency in reading and math than schools with low concentrations. LPG4 seems to have the most pronounced difference between high and low

concentration schools. The association between LPG4 and proficiency in math and reading is significant ($p<.05$) at all grade levels, except eighth grade math.

Finally, longitudinal regression was used to study multiple schools in each LEA. Using least squares means, the confounding factors were controlled and the association with school culture, as demonstrated through responses to Q7.3 on the NC TWCS was found to be significant ($p<.05$) for LPG4: Mostly Disagree, Some Strongly Disagree for third through eighth grades in both reading and math at all grade levels, 3-8. School culture as represented by LPG5: Mostly Don't Know, was found to be significantly associated with reading and math proficiency in third through fifth grade. School culture as represented by LPG1: Mostly Strongly Agree are significantly associated with math and reading proficiency in third grade and also in eighth grade math proficiency in that (describe). School culture as represented by LPG2: Mostly Agree, Some Strongly Agree significantly affected reading and math proficiency in fourth grade reading and math.

Output from the longitudinal regression model provides specific information regarding the percentage of change for each confounding factor, within the median split groups. The information is reported by median split groups at each level and includes *p*-values for each measure. Complete output for the longitudinal regression can be found in Appendix A of this dissertation.

CHAPTER 5: SUMMARY AND DISCUSSION

As previously mentioned, the purpose of this study was to explore the relationship between school culture (as indicated by teachers' responses to the TWCS Q7.3) and student achievement (as measured on North Carolina End-of-Grade tests). The impetus for this work was to bring clarity to the idea that school principals should understand the "important role a school's culture contributes to the exemplary performance of the school;" and to provide focus for the task of reculturing schools to improve student learning, as stated in NCSSE (2011), Standard 3, Cultural Leadership.

Statement of the Problem

The North Carolina State Board of Education has deemed the culture of a school to be so significant that it is included in their NCSSE as Standard 3, Cultural Leadership (NCDPI, 2006). However, Standard 3 does not specifically identify which aspects of culture may have a positive effect on student learning. The standard states that the school executive will "understand and act on the understanding of the important role a school's culture contributes to the exemplary performance of the school" (NCDPI, 2006, p. 5). The NC TWCS is listed as an artifact that can be used to verify cultural leadership in NC schools, however, with 72 items on the survey, the intent of its use by the principal to verify cultural leadership is unclear. Therefore, the problem is twofold. (1) How can the principal use the NC TWCS to understand the culture of their school, and (2) how can the principal use the information gained from the NC TWCS to understand the school's achievement data. In other words, how can principals use the data that are currently available to them to understand his or her school's culture and its association with student achievement and how can they use that information to make a difference in their

schools? The language of the standard implies that the administrator understands this and should act upon that understanding.

Review of the Methodology

Data for this study were obtained from three sources. The NC TWCS data were provided by the New Teacher Center, data from 2012 EOG testing were provided by the NC Department of Public Instruction and economic data were easily retrievable from the NC Commerce Department's public website. All data were public domain. The NC TWCS was used to determine school culture, specifically Q7.3. Because the sub-items of that question closely resembled both descriptions of school culture from the literature and the description of school culture from Standard 3 of the NCSSE, Q7.3 served as the proxy for school culture for this study.

Hierarchical clustering was used to create Leadership Perception Groupings (LPGs) that could be compared to achievement data. The goal was to determine if respondents clustered around any of the five Likert-style responses to Q7.3 associated with higher or lower student achievement. To further understand the LPGs and their effect on student achievement, three confounding factors were considered and adjustments were made for their effects. The factors were teachers' experience, teachers' length of employment in their current school, and economic tier of the LEA. Finally, to determine the level of association between the LPGs and percent proficiency, the groupings were observed at the school level and then split at their median so that high and low concentrations of teachers in each LPG, at each school, could be observed and their effects could be studied. Longitudinal regression was used for the final multivariate analysis of the data. The longitudinal model was appropriate to study the several (schools) within an LEA. A single, common correlation estimate for within LEA associations was assumed (compound symmetry). The correlations between schools were estimated to be a common value because

there is nothing to distinguish one unit (school) from another. Significance was found at several grade levels, for reading and for math, as it related to several of the median split groupings.

Summary of the Results

Based on the literature regarding school culture, Q 7.3 of the NCTWC is a good proxy for school culture for this study. The nine components of Q 7.3 represent the definitions of school culture, as well as the practices associated with school culture in the NC Standards for School Executives. Results can be easily tabulated based on the Likert scale from Strongly Disagree to Disagree to Agree to Strongly Agree to Don't Know.

Hierarchical clustering created 5 LPGs that are more similar to each other than to other participants based on their responses to Question 7.3 of the NC TWCS. LPG1: Mostly Strongly Agree is about 13.3% of the data set. LPG1 includes the highest percentage of very experienced teachers (20+ years). LPG2: Mostly Agree, Some Strongly is the largest grouping with about 36% of the participants. LPG3: Strongly Agree, No Variation is about 30% of the participants..

These participants marked their surveys "Agree" to every question. LPG4: Mostly Disagree, Some Strongly Disagree comprises about 14% of the participants and LPG5: Mostly Don't Know is about 6% of the participants and is made up largely of first year teachers.

In order to get to the effect of culture, as represented by the clustered respondents to Question 7.3 of the NC TWCS, three potentially confounding variables were considered: teachers' experience in the profession, length of time teaching in current school and socio-economic status of the LEA. Experience and years teaching in the current school were self-reported by the teachers. Socio-economic status was estimated based on the economic tier of the LEA. ANOVA testing suggested that economic tier had a significant effect on student achievement except when paired with schools with a high concentration of LPG1 teachers.

To better understand the connection between the groupings and student achievement, each LPG was split at the median into two groups – schools with high concentrations of the particular LPG, and those with a lower concentration of the LPG. The median split revealed that schools with high concentrations of LPG1, or teachers that believe their school leadership addresses their concerns, have higher proficiency percentages in reading and math. Conversely, schools with high concentrations of teachers in LPG4: Mostly Disagree, Some Strongly Disagree seem to have lower percentages of proficiency in reading and math. LPG4 seems to have the most pronounced difference in student achievement between high and low concentration schools.

Finally, longitudinal regression was used to study multiple schools through each of the groupings. Using least squares mean, the potentially confounding variables were controlled and the relationship between school culture, as demonstrated through responses to Question 7.3 on the NC TWCS, and student achievement was found to be significant for LPG4: Mostly Disagree, Some Strongly Disagree for third through eighth grades in both reading and math. School culture as represented by LPG5: Mostly Don't Know, was found to have a significant relationship with reading and math proficiency in third through fifth grade. School culture as represented by LPG1: Mostly Strongly Agree significantly related to math and reading proficiency in third grade and also in eighth grade math proficiency. School culture as represented by LPG2: Mostly Agree, Some Strongly Agree significantly related to reading and math proficiency in fourth grade reading and math.

Discussion of Results

As mentioned, the multivariate analysis of the data in this study indicates significant association between many of the median-split groupings and student achievement. Based on this

study alone, it is difficult to make a definitive statement about the effect of school culture, as measured by Q 7.3, on student achievement. While significant *p*-values were reported for about half of the subject and grade level achievement data, unanswered questions remain. For example, high concentrations of the positive median-split groups (LPG1 and LPG2) seem to have the greatest association with young students' achievement (grades 3 – 5), while the most negative group (LPG4) seems to have a strong association with the achievement of all students (grades 3-8). About half of the grade level/content area achievement results show no effect based on this measure of school culture. According to the multivariate analysis, there is greater significance in the reading results than the math for the students in grades 3-5. However, the significance is greatest in the middle grades for both reading and math but, as mentioned earlier, only LPG4 affects achievement in grades 6-8.

A close comparison of Tables 20 and 21 in chapter 4 reveals that the significant associations between school culture and proficiency, after adjustments have been made, only accounts for 1.3% to 6.01% difference in the percentage of proficient students in a school or LEA. While statistically significant, at face value, these percentages seem negligible. However, to put the figures in perspective, in a class of 20 students, this means that one more student fails or succeeds relative to the culture of the school. In a school of 500 students, 30 students fail or succeed relative to the culture of the school. In a school district of 10,000 students, 600 students fail or succeed, relative to the culture of the district.

Furthermore, a close examination of the change in math percent proficient for 4^{th} grade after the adjustment for confounding factors, relative to LPG4, reveals the importance of the association between school culture and student achievement. In unadjusted scores, the difference between high concentration of LPG4 teachers and low concentration of LPG4 teachers is 5.48%.

When the means were adjusted for economic tier, experience of the teacher, years experience in the current school and for all other LPGs, a 2.61% difference remained. Therefore, the confounding factors, when taken all together, accounted for 2.87%. School culture accounted for the remaining association.

The NC TWCS is completed by teachers across the state of North Carolina bi-annually. The questions on the survey, Q7.3 in particular, ask about the *school* leadership. For this study, we assumed an inherent correlation between schools in districts because schools within a district are operating in the same economic tier and under the same district-level leadership (the superintendent). The policies, procedures and protocols within a school district are common because the leadership in the district is common to all schools. Even though the NC TWCS addresses school leadership, because of the framework of leadership in North Carolina schools, the policies and procedures that are implemented throughout the district are subsequently administered by the school principal at the school level. These layers of leadership, create an environment in which it is difficult to determine whether the leadership being evaluated by teachers is actually school or district level policy and protocol. There is no practical way, with the current survey, to disentangle the leadership of the school from the leadership of the district.

The associations are strong enough to provide interpretations of the analyses that can be used by school leadership assessing their own data and planning for school improvement. School culture, as identified by teachers' responses to Q7.3 of the NC TWCS, can be a predictor or sound an alarm about student achievement in the school. Practicing North Carolina school administrators can consider their 2012 NC TWCS results and the results from subsequent years and confidently make sense of the information in the following ways.

Interpretation #1

Teachers' perception that their school leadership addresses their concerns about leadership issues, facilities and resources, use of time, professional development, teacher leadership, community support and involvement, managing student conduct, instructional practices and support and new teacher support matters. Q 7.3 gave the teachers the opportunity to express their level of agreement regarding their administrators' behavior and those responses are a proxy for the culture in the school.

Interpretation #2

Based on the statistical output from the longitudinal regression, the administrators' reactions to their teachers concerns are related to the effectiveness of the teachers. Students' percent proficiency on grade level assessments varied by as many as 3.99 percentage points dependent upon their teachers' level of satisfaction with school leadership.

Interpretation #3

The concentration of teachers in an LPG, within a school, matters. For example, for LPG2, whose effect is particularly significant in grades 3-5 reading, a high concentration is >35% of the teachers. In a school of 20 teachers, a positive effect can be felt when at least seven teachers mostly agree that their school leadership addresses their concerns. Conversely, LPG4 teachers can be considered to be dissatisfied with their administrators' attention to their concerns. Because of the median split of LPG4, a high concentration of LPG4 teachers is > 11%. Therefore, if a middle school of 20 teachers has just 3 teachers in LPG4, the reading and math scores in grades 6-8 can be 3 to 4 points below the mean for schools with high concentrations of LPG4 teachers.

Research Questions

The guiding questions for this study were based on a sense that school administrators in North Carolina have been expected to be cultural leaders of their schools with little guidance as to what that actually means. They have been asked to use an available source of data, the NC TWCS, as evidence of their cultural leadership, without understanding the association of the NC TWCS to the culture of their schools, and without being sure that culture, as measured by that survey, really affects the achievement of their students. The quantitative analysis of the data in this study provides answers to the research questions and provides meaningful interpretations of the information gleaned from the NC TWCS.

1. How does school culture, as identified by respondents on the 2012 NC TWCS, relate to student achievement, as measured by 2012 North Carolina end-of-grade testing proficiency percentages?

Hierarchical clustering produced five Leadership Perception Groupings that were split at the median and then analyzed to determine their association with percent proficiency in reading and math in grades three through eight. The association was found to be significant in about half of the grade/subject groups. It is notable that LPG4 significantly associated with student achievement most consistently. This LPG reflects respondents who Strongly Disagree or Disagree that their school leadership addresses their concerns in the nine areas of Q7.3. When there was a high concentration of LPG4 teachers in a school, reading and math achievement in all grades and subjects except eighth grade math were significantly related.

2. Is the perception that school leadership addresses the concerns of teachers in specific areas of leadership (time, facilities and resources, professional development,

managing student conduct, instructional practices and support and new teacher support) related to student achievement?

While a high concentration of teachers in LPG1 seems to positively associate with reading proficiency in grades 3-5, the negative impact of LPG4 is more pervasive. The consequence of negative culture can be up to 4 percent of children being assessed and not achieving proficiency in reading or in math. The effectiveness of teachers who are dissatisfied in the workplace may be compromised and the end result is that children lose ground. At the classroom level, this could be one or two students. At the school level it could mean that 20 or 30 students fail or succeed relative to the culture of the school. At the LEA level this can translate into hundreds of students.

3. What do the results of a study of the association between student achievement and teacher working conditions provide by way of specific guidance to building administrators who are focused on creating a school culture that will contribute to students' academic growth?

The ultimate focus of this study is to provide clarity for school administrators struggling to create an environment that is, according to Standard 3 of the NCSSE, "predicated on site-based management that supports the 'team' as the basic unit of learning and decision making within the school and promotes cohesion and cooperation among staff (2011, p. 5)." A good first step is to look at the school's responses to Q7.3 and consider the results as a marker for school culture.

Recommendations

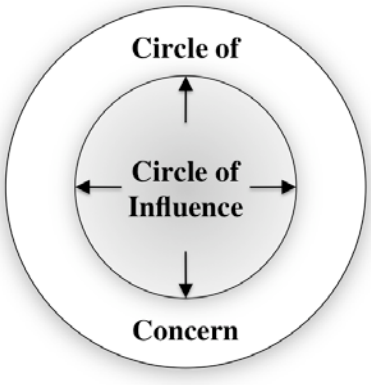
Question 7.3 from the 2012 NC TWCS asked teachers to express their satisfaction with their school leadership's attention to their concerns. The concerns included in Q7.3 cover many

of the aspects of school culture mentioned in the literature and in the NCSSE Standard 3, Cultural Leadership. The teachers' satisfaction with their administrators in the area of attention and concern seems to permeate the culture of the school and the effectiveness of the teachers.

Concern and attention can be considered both attitude and behavior. As such, these leadership challenges are within the control of the school administrator. The Seven Habits of Highly Effective People lists, as its first and foundational habit, Be Proactive (Covey, 1989). Regarding Habit 1, Be Proactive, Covey describes leadership challenges as being in our circle of concern or our circle of influence, which lies within the circle of concern (see Figure 19). Covey wrote, "Proactive people focus their efforts on their circle of influence. They work on the things they can do something about (Covey, 1989)." Interestingly, Q7.3 does not ask if the school leadership solves all of the teachers' problems, it simply asks the teachers if their school leadership makes a sustained effort to address their concerns in nine key areas. The word "sustained" suggests that the school leadership's attention to the teachers' concerns is a continuing or common practice. Proactive school administrators can work on the things they can do something about, namely their own attention to the concerns of their teachers.

The results of this study confirm that there is an association between student achievement and school culture. Q7.3 of the 2012 NC TWCS serves as the proxy for school culture in this study, and addresses behaviors and attitudes of school administrators. These results bring Standard 3 of the NCSSE into focus and give the practicing administrator both a target and data to support the value of hitting the target.

Addressing the concerns of teachers regarding the nine important sub-items of Q7.3 of the 2012 NC TWCS is a behavior that is within the control of the administrator. The



From Stephen Covey's (1989) Seven Habits of Highly Effective People.

Figure 19. Covey's Circle of Influence.

administrator's actions, or non-actions, are associated with the effectiveness of teachers as demonstrated by the results of their students on the 2012 NC EOGs. The reason for the significant difference in test scores cannot be fully understood with the results of this study, but stated simply, the results of this study seem to imply that positive culture is associated with positive results while negative culture is associated with negative results. The mandate for school leadership should be clear. The impact of principals' engagement with the educators in their school is important.

Institutions of higher education dedicate courses in masters and doctorate programs to the mastery of school law, school finance, public school policy, curriculum, and supervision. The findings in this study suggest that the importance of school culture should not go unexplored in graduate level study. The association of student achievement with school culture, specifically the leadership behaviors of principals and superintendents, warrants preparation at the graduate level to enable administrators and the school and district level to effectively implement Standard 3 of the NCSSE and the NC Standards for Superintendents. Graduate coursework designed to address the culture of a school or school district could support leaders in their effort to create or maintain a positive and healthy school culture or to reculture a school for school improvement.

Finally, the temptation to attribute the significant increase or decrease in scores to economic status or to the level of experience of the teacher has been addressed in this study. Multivariate analysis adjusted the results for these confounding factors and the significance remained for about half of the median-split LPGs. While the confounding factors contribute to the achievement levels of the students, they do not nullify the final results.

Limitations of the Current Study

This study provided preliminary data about the association between school culture, as gleaned for the responses on a particular item of the 2012 NC TWCS, and student achievement. Since North Carolina does not utilize a survey designed specifically to measure school culture, the decision to use the NC TWCS necessitated that definitions and descriptions of school culture be matched to an item or items on the NC TWCS. Question 7.3 was a good match but some important aspects of school culture were not addressed in the sub-items of Q7.3. The NC TWCS allows us to understand the perceptions of teachers about their school culture and, through teacher responses, it gives a glimpse into the reported actions and attitudes of administrators. The NC TWCS does not help to identify important beliefs and guiding principles that shape the culture of individual schools.

The student achievement data for this study were reduced from the 2012 data set that included scores and proficiency percentages from each school, tested grade and subject across the state. Both the NC TWCS and 2012 EOG data were obtained from organizations that initially collected the information. Therefore, for this study, both were secondary data. Secondary data has advantages and disadvantages. The advantage is that the information was already collected, organized and relatively complete. It was available at no charge and was delivered digitally in just a few days. The disadvantage of using secondary data is that the researcher has no control over the specific information that is gathered or reported. For example, if NC TWCS results had included grade level or subject taught, it could have been more specifically matched to the EOG data. Similarly, if EOG and NC TWCS data were identifiable at the teacher level, the information could have been matched and analyzed for significance using ANOVA or multiple regression analysis.

However, to use the secondary data for this study, cluster analysis provided an approach that allowed the data to be explored and analyzed for significance. Cluster analysis typically provides a methodology for sorting and classifying data and then exploring the patterns that develop. The five-cluster solution allowed the teachers' responses to the NC TWCS to be studied and analyzed but the effect of each grouping on student achievement was not apparent. Only when the LPGs were split at the median could a distinction begin to be made about high and low concentrations of teachers in a LPG, within a school. Median splits are problematic in that respondents on either side of the median sometimes remain very close together so that even though the median-split LPG group was designated as a high or low concentration of teachers in a grouping, in reality those close to the median may not differ greatly.

From this study, it can be concluded that the concentration of teachers in a particular grouping is associated with test scores in about half of the median-split LPGs. Because this study only adjusted for economic tier and teacher experience, it is possible that other confounding factors like race or disabilities may further affect the achievement results. The inclusion of these confounding factors in the analysis would provide deeper meaning and a rich source of information for school administrators charged with reculturing their school. A similar study of previous or subsequent years may reveal trend data that would further refine the results.

The measure of student achievement used for this study was percent proficient only. When studying this information for trend data, it may be interesting to use the growth measure that is additionally reported by NCDPI to help discern changes in student achievement over multiple years as compared to school culture. Trend data could only be considered from the school level because NC TWCS data is reported at the school level and is anonymous. Therefore,

it is not possible to understand whether the same teachers participated in the survey for their particular school in previous years.

The results from this analysis are compelling but leave some important questions unanswered. Are these results unique to North Carolina or are they representative of the southeastern United States or maybe even the nation? And, if North Carolina school principals are responsible for the Cultural Leadership of their school, would it be reasonable to expect the state to provide a survey that is designed to measure school culture specifically? Such a survey could provide the information that would support school improvement in a much more direct manner rather than the advanced statistical methods that were required to reveal the associations reported in this study.

Recommendations for Further Research

Additional research studies are needed in order to further understand the effects of school culture on student achievement. This analysis was adjusted for confounding factors, but it may help to further clarify the effects of school culture to address other potentially confounding factors like ethnicity and students with disabilities. A look at the growth measure could provide important trend data if results were studied over several biannual Teacher Working Conditions Surveys.

Question 7.3 of the 2012 NC TWCS consisted of nine sub-items. A deconstruction of Q 7.3 to determine the significance of the effect of the individual sub-items would further clarify the importance of the various facets of school culture for building administrators. While comparing the survey results to achievement results is a strictly quantitative exercise, a case study of schools with identified positive or negative culture based on the quantitative study

would provide further insight into the culture of the schools and the practices that impact student achievement.

This study addresses the achievement of students in grades three through eight in reading and math. The school culture of high schools in North Carolina and the association of that culture with student achievement would lend depth to this study and provide invaluable information for school leaders working in the high school setting. The achievement data differs greatly in North Carolina high schools as End-of-Course tests are only given in relation to a small number of courses and are not grade specific. Therefore, age of student would become a potentially confounding factor in a high school study.

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APPENDIX A: LONGITUDINAL REGRESSION OUTPUT

Grades 3-5

	Grade 3 Math			Grade 4 Math			Grade 5 Math		
Effect	Estimate	Standard Error	*p*-value	Estimate	Standard Error	p-value	Estimate	Standard Error	p-value
Intercept	81.2	5.0	<.0001	82.2	5.17	<.0001	81.7	5.26	<.0001
Tier 1	-6.3	1.4	<.0001	-3.7	1.28	0.0043	-6.3	1.49	<.0001
Tier 2	-2.6	1.3	0.0512	-1.3	1.19	0.2947	-2.3	1.40	0.0992
Tier 3 (Reference)									
Percentage of First Year Teachers	-24.3	7.6	0.0015	-20.2	7.89	0.0107	-21.2	7.64	0.0055
Percentage of 2-3 Year Teachers	-14.2	6.2	0.0212	-17.7	6.31	0.0052	-13.2	6.30	0.0361
Percentage of 4-6 Year Teachers	-8.4	5.0	0.0929	-1.4	5.10	0.7875	-0.5	5.08	0.9268
Percentage of 7-10 year Teachers	-10.9	4.9	0.0265	-13.2	4.98	0.008	1.4	4.99	0.7751
Percentage of 11-20 Year Teachers	2.3	4.3	0.5893	1.4	4.38	0.7526	6.5	4.43	0.1444
Percentage of 20+ Year Teachers (Reference)									
Percentage of First Year Teachers at Current School	-6.2	6.6	0.3461	-2.2	6.79	0.7471	-12.4	6.75	0.067
Percentage of 2-3 Year Teachers at Current School	6.3	6.3	0.3147	5.1	6.44	0.4326	-0.8	6.49	0.9069
Percentage of 4-6 Year Teachers at Current School	13.3	6.3	0.0342	7.4	6.44	0.2474	1.2	6.51	0.849
Percentage of 7-10 Year Teachers at Current School	9.0	6.6	0.1737	8.9	6.81	0.1894	4.9	6.87	0.4739
Percentage of 11-20 Year Teachers at Current School	6.6	6.6	0.3137	6.5	6.81	0.3373	2.7	6.89	0.6944

Mostly Strongly Agree Median Split - Low	-1.6	0.7	0.0255	-0.1	0.71	0.9282	-0.9	0.70	0.1947
Mostly Strongly Agree Median Split - High	0.0	.	.	0.0	.		0.0	.	.
Mostly Agree, Some Variation Median Split - Low	0.5	0.6	0.4279	1.3	0.65	0.0495	1.2	0.65	0.0603
Mostly Agree, Some Variation Median Split - High (Reference)	0.0	.	.	0.0	.		0.0	.	.
All Agree, No Variation Median Split - Low	-0.8	0.7	0.2109	-1.0	0.68	0.1337	-1.0	0.68	0.1588
All Agree, No Variation Median Split - High	0.0	.	.	0.0	.		0.0	.	.
Mostly Disagree, Some Strongly Disagree Median Split - Low	1.9	0.7	0.0065	1.7	0.71	0.202	1.9	0.71	0.0088
Mostly Disagree, Some Strongly Disagree Median Split - High	0.0	.	.	0.0	.		0.0	.	.
Mostly Don't Know Median Split - Low	1.9	0.6	0.002	2.1	0.62	0.0011	1.7	0.62	0.0083
Mostly Don't Know Median Split - High	0.0	.	.	0.0	.		0.0	.	.

	Grade 3 Reading			Grade 4 Reading			Grade 5 Reading		
Effect	Estimate	Standard Error	p-value	Estimate	Standard Error	p-value	Estimate	Standard Error	p-value
Intercept	79.8	6.28	<.0001	80.0	6.26	<.0001	77.8	6.07	<.0001
Tier 1	-8.6	1.75	<.0001	-7.2	1.81	0.0001	-8.0	1.75	<.0001
Tier 2	-5.0	1.65	0.003	-2.9	1.71	0.0875	-3.4	1.65	0.0409
Tier 3	0.0	.	.	0.0	.	.	0.0	.	.
Percentage of First Year Teachers	-43.8	9.52	<.0001	-28.4	9.50	0.0029	-34.9	8.81	<.0001
Percentage of 2-3 Year Teachers	-29.6	7.68	0.0001	-35.0	7.58	<.0001	-29.6	7.26	<.0001

Percentage of 4-6 Year Teachers	-27.3	6.20	<.0001	-23.7	6.12	0.0001	-14.7	5.85	0.012
Percentage of 7-10 year Teachers	-13.9	6.09	0.0226	-15.6	5.98	0.0091	-7.6	5.74	0.185
Percentage of 11-20 Year Teachers	-4.1	5.30	0.4342	-3.0	5.26	0.5622	2.4	5.10	0.6408
Percentage of First Year Teachers at Current School	-13.6	8.21	0.0968	-16.6	8.16	0.0423	-15.4	7.78	0.0484
Percentage of 2-3 Year Teachers at Current School	0.4	7.83	0.9631	1.8	7.72	0.8197	0.4	7.48	0.954
Percentage of 4-6 Year Teachers at Current School	9.9	7.82	0.2064	6.6	7.72	0.3959	3.2	7.49	0.6706
Percentage of 7-10 Year Teachers at Current School	1.7	8.21	0.8314	4.8	8.16	0.5572	6.1	7.91	0.4436
Percentage of 11-20 Year Teachers at Current School	4.7	8.20	0.5644	3.2	8.16	0.694	3.5	7.94	0.6635
Mostly Strongly Agree Median Split - Low	-2.0	0.86	0.0229	-0.8	0.85	0.3398	-1.2	0.81	0.1266
Mostly Strongly Agree Median Split - High	0.0	.	.	0.0	.	.	0.0	.	.
Mostly Agree, Some Variation Median Split - Low	0.3	0.79	0.6964	1.7	0.78	0.0328	1.4	0.75	0.0754
Mostly Agree, Some Variation Median Split - High	0.0	.	.	0.0	.	.	0.0	.	.
All Agree, No Variation Median Split - Low	-0.8	0.82	0.3305	-0.3	0.81	0.6741	-0.5	0.78	0.5323
All Agree, No Variation Median Split - High	0.0	.	.	0.0	.	.	0.0	.	.
Mostly Disagree, Some Strongly Disagree Median Split - Low	2.6	0.85	0.0029	2.9	0.85	0.0009	2.9	0.81	0.0005
Mostly Disagree, Some Strongly Disagree Median Split - High	0.0	.	.	0.0	.	.	0.0	.	.
Mostly Don't Know Median Split - Low	2.9	0.75	0.0002	2.7	0.75	0.0006	2.4	0.72	0.0011

Mostly Don't Know Median Split - High	0.0	.	.	0.0	.	.	0.0	.	.

Grades 6-8

	Grade 6 Math			Grade 7 Math			Grade 8 Math		
Effect	Estimate	Standard Error	p-value	Estimate	Standard Error	p-value	Estimate	Standard Error	p-value
Intercept	78.9	11.15	<.0001	84.6	11.86	<.0001	84.3	12.31	<.0001
Tier 1	-4.9	1.94	0.013	-6.4	2.07	0.0026	-6.2	2.27	0.0075
Tier 2	-2.3	1.71	0.183	-3.7	1.81	0.0451	-4.7	2.03	0.0228
Tier 3 (Reference)									
Percentage of First Year Teachers	21.5	14.72	0.1447	58.9	16.59	0.0004	58.2	17.28	0.0008
Percentage of 2-3 Year Teachers	-3.2	12.86	0.8047	10.6	13.90	0.4447	13.5	14.24	0.3424
Percentage of 4-6 Year Teachers	26.2	10.26	0.0109	32.6	11.68	0.0054	31.0	12.09	0.0107
Percentage of 7-10 year Teachers	-1.2	10.54	0.91	26.1	11.78	0.0274	27.9	12.33	0.024
Percentage of 11-20 Year Teachers	32.3	9.09	0.0004	29.9	10.34	0.004	28.7	10.84	0.0083
Percentage of 20+ Year Teachers (Reference)									
Percentage of First Year Teachers at Current School	-39.6	13.77	0.0042	-68.3	15.29	<.0001	-68.3	15.92	<.0001
Percentage of 2-3 Year Teachers at Current School	-23.3	13.50	0.0845	-39.3	14.45	0.0068	-37.8	14.92	0.0116
Percentage of 4-6 Year Teachers at Current School	-19.3	13.17	0.1431	-33.7	14.19	0.0178	-25.9	14.71	0.0788
Percentage of 7-10 Year Teachers at Current School	-1.7	14.38	0.9042	-18.3	16.17	0.2573	-23.2	16.72	0.1662
Percentage of 11-20 Year Teachers at Current School	1.7	14.42	0.9068	5.9	15.51	0.7029	3.6	15.88	0.8208
Mostly Strongly Agree Median Split - Low	0.7	1.42	0.6296	1.1	1.63	0.5031	3.4	1.69	0.0477

Mostly Strongly Agree Median Split - High	0.0	.	.	0.0	.	.	0.0	.	.
Mostly Agree, Some Variation Median Split - Low	-0.7	1.34	0.6096	-0.8	1.56	0.6136	1.2	1.62	0.4667
Mostly Agree, Some Variation Median Split - High (Reference)	0.0	.	.	0.0	.	.	0.0	.	.
All Agree, No Variation Median Split - Low	-0.3	1.43	0.815	-1.8	1.64	0.2654	-0.1	1.70	0.9595
All Agree, No Variation Median Split - High	0.0	.	.	0.0	.	.	0.0	.	.
Mostly Disagree, Some Strongly Disagree Median Split - Low	3.0	1.45	0.0438	3.6	1.67	0.036	3.3	1.73	0.0579
Mostly Disagree, Some Strongly Disagree Median Split - High	0.0	.	.	0.0	.	.	0.0	.	.
Mostly Don't Know Median Split - Low	-0.8	1.27	0.5468	-1.1	1.45	0.4596	-0.3	1.51	0.8429
Mostly Don't Know Median Split - High				0.0	.	.	0	.	

	Grade 6 Reading			Grade 7 Reading			Grade 8 Reading		
Effect	Estimate	Standard Error	p-value	Estimate	Standard Error	p-value	Estimate	Standard Error	p-value
Intercept	72.0	10.99	<.0001	69.5	11.68	<.0001	71.1	11.30	<.0001
Tier 1	-7.6	2.13	0.0006	-10.5	2.37	<.0001	-9.0	2.27	0.0001
Tier 2	-3.8	1.95	0.0541	-4.5	2.15	0.0391	-5.0	2.07	0.0162
Tier 3	0.0	.	.	0.0	.	.	0.0	.	.
Percentage of First Year Teachers	9.0	14.45	0.5359	23.9	16.22	0.1405	33.4	15.79	0.0352
Percentage of 2-3 Year Teachers	-8.5	12.63	0.5003	-16.1	13.57	0.2364	-9.2	13.00	0.4783
Percentage of 4-6 Year Teachers	17.6	10.08	0.0809	13.4	11.43	0.2414	7.9	11.04	0.4769
Percentage of 7-10 year	-10.6	10.36	0.3047	6.2	11.49	0.5876	25.9	11.26	0.0221

Teachers									
Percentage of 11-20 Year Teachers	27.5	8.91	0.0021	16.5	10.06	0.1026	24.1	9.87	0.0149
Percentage of First Year Teachers at Current School	-32.5	13.54	0.0167	-42.6	14.98	0.0046	-53.1	14.57	0.0003
Percentage of 2-3 Year Teachers at Current School	-11.2	13.25	0.3976	-17.2	14.13	0.2252	-19.9	13.64	0.1459
Percentage of 4-6 Year Teachers at Current School	-12.6	12.93	0.3299	-12.9	13.88	0.3515	-15.5	13.45	0.2496
Percentage of 7-10 Year Teachers at Current School	11.0	14.12	0.4375	-1.3	15.80	0.9367	-7.3	15.28	0.6325
Percentage of 11-20 Year Teachers at Current School	7.6	14.12	0.5928	18.1	15.11	0.2328	4.2	14.49	0.7743
Mostly Strongly Agree Median Split - Low	0.6	1.39	0.6906	0.7	1.59	0.6526	1.8	1.54	0.26
Mostly Strongly Agree Median Split - High	0.0	.	.	0.0	.	.	0.0	.	.
Mostly Agree, Some Variation Median Split - Low	0.8	1.31	0.5655	-0.9	1.51	0.5522	-0.2	1.47	0.8739
Mostly Agree, Some Variation Median Split - High	0.0	.	.	0.0	.	.	0.0	.	.
All Agree, No Variation Median Split - Low	-0.9	1.40	0.5178	-1.8	1.59	0.2492	-1.4	1.55	0.3662
All Agree, No Variation Median Split - High	0.0	.	.	0.0	.	.	0.0	.	.
Mostly Disagree, Some Strongly Disagree Median Split - Low	3.1	1.42	0.0301	4.0	1.61	0.0166	4.0	1.57	0.013
Mostly Disagree, Some Strongly Disagree Median Split - High	0.0	.	.	0.0	.	.	0.0	.	.
Mostly Don't Know Median Split - Low	-0.1	1.24	0.911	0.1	1.41	0.9462	0.3	1.37	0.8114
Mostly Don't Know Median Split - High	0.0	.	.	0.0	.	.	0.0	.	.

APPENDIX B: LPGS BY NORTH CAROLINA LOCAL EDUCATION AUTHORITIES (LEAS)

	LPG1: Mostly Strongly	LPG2: Mostly Agree - Some Variation	LPG3: All Agree - No Variation	LPG4: Mostly Disagree, Strongly Disagree	LPG5: Mostly Don't Know	Total Number of Schools in LEA
LEA	Mean Percentage					
Alamance-Burlington	7%	35%	27%	21%	10%	28
Alexander	16%	32%	42%	6%	4%	9
Alleghany	13%	25%	50%	7%	5%	3
Anson	9%	35%	36%	16%	5%	7
[illegible]e	16%	45%	27%	6%	6%	4
[illegible]eboro City	10%	41%	28%	15%	7%	7
[illegible]eville City	9%	46%	17%	24%	4%	6
Avery	20%	35%	29%	12%	4%	7
Beaufort	13%	38%	32%	12%	5%	9
Bertie	18%	23%	37%	13%	9%	5
Bladen	13%	33%	33%	17%	4%	11
Brunswick	15%	38%	30%	12%	5%	15
Buncombe	14%	38%	28%	13%	6%	32
Burke	19%	30%	33%	11%	7%	22
Cabarrus	12%	36%	31%	14%	6%	28
Caldwell	19%	34%	31%	12%	5%	21
Camden	12%	31%	43%	8%	6%	3
Carteret	17%	33%	33%	11%	6%	13
Caswell	8%	40%	31%	18%	3%	5
Catawba	17%	35%	35%	9%	5%	22
Chapel-Hill Carrboro	13%	41%	21%	15%	11%	14
Charlotte-Mecklenburg	12%	36%	29%	16%	7%	133
Chatham	14%	33%	33%	12%	8%	13
Cherokee	23%	29%	36%	7%	5%	9
Cherokee Reservation	6%	44%	22%	24%	4%	2
Clay	4%	35%	43%	14%	5%	2
Cleveland	24%	32%	35%	6%	3%	24
Clinton City	8%	32%	47%	8%	4%	3
Columbus	24%	22%	45%	7%	2%	15
Craven	15%	36%	31%	13%	5%	20

Cumberland	15%	35%	29%	16%	5%	66
Currituck	12%	40%	24%	16%	7%	8
Dare	14%	40%	27%	13%	6%	8
Davidson	9%	38%	36%	12%	5%	25
Davie	23%	35%	28%	11%	3%	10
Duplin	10%	35%	30%	15%	10%	12
Durham	17%	37%	25%	15%	7%	42
Edenton-Chowan	9%	26%	58%	5%	1%	2
Edgecombe	5%	39%	31%	19%	6%	11
Elizabeth City/Pasquotank	12%	38%	31%	14%	5%	10
Elkin City	16%	37%	42%	3%	1%	2
Forsyth	11%	39%	29%	15%	7%	63
Franklin	13%	36%	33%	14%	5%	11
Gaston	14%	37%	30%	14%	4%	42
Gates	14%	36%	41%	5%	3%	4
Graham	19%	30%	44%	6%	1%	2
Granville	10%	35%	36%	14%	6%	14
Greene	10%	31%	49%	5%	4%	2
Guilford	12%	37%	28%	16%	7%	94
Halifax	10%	35%	29%	18%	7%	9
Harnett	8%	35%	31%	20%	6%	20
Haywood	15%	38%	30%	13%	3%	12
Henderson	20%	36%	30%	9%	6%	18
Hertford	10%	42%	30%	11%	7%	4
Hickory City	11%	40%	31%	13%	6%	7
Hoke	19%	33%	28%	14%	6%	11
Hyde	13%	41%	27%	10%	8%	3
Iredell-Statesville	21%	34%	32%	10%	3%	28
Jackson	20%	34%	33%	11%	3%	7
Johnston	11%	36%	34%	15%	4%	34
Jones	29%	34%	32%	3%	1%	5
Kannapolis City	17%	34%	36%	8%	5%	7
Lee	14%	40%	32%	10%	4%	12
Lenoir	13%	30%	46%	7%	4%	13
Lexington City	4%	35%	35%	18%	8%	4
Lincoln	26%	29%	24%	16%	5%	18
Macon	12%	32%	36%	13%	7%	9
Madison	16%	29%	43%	10%	3%	5
Martin	13%	26%	41%	14%	6%	8
McDowell	19%	32%	34%	10%	4%	10
Mitchell	19%	17%	29%	18%	17%	5

Montgomery	10%	32%	39%	16%	3%	8
Moore	14%	38%	32%	11%	6%	18
Mooresville Graded	14%	29%	29%	20%	7%	6
Mount Airy City	4%	40%	30%	17%	10%	2
Nash-Rocky Mount	17%	30%	36%	12%	4%	20
New Hanover	16%	41%	24%	15%	5%	33
Newton Conover City	17%	27%	36%	17%	2%	5
Northampton	6%	28%	32%	27%	8%	6
Onslow	13%	32%	27%	17%	10%	27
Orange	11%	38%	32%	12%	7%	10
Pamlico	9%	34%	51%	4%	2%	2
Pender	29%	33%	23%	9%	6%	11
Perquimans	25%	42%	24%	6%	4%	2
Person	19%	32%	35%	8%	7%	9
Pitt	11%	35%	36%	11%	7%	28
Polk	32%	31%	21%	13%	3%	5
Randolph	14%	32%	34%	15%	5%	24
Richmond	16%	29%	35%	13%	6%	13
Roanoke Rapids City	11%	32%	35%	16%	7%	3
Robeson	16%	30%	36%	16%	3%	34
Rockingham	10%	40%	34%	12%	4%	21
Rowan-Salisbury	13%	35%	33%	14%	5%	28
Rutherford	20%	30%	37%	10%	3%	14
Sampson	18%	26%	42%	9%	6%	13
Scotland	15%	28%	32%	16%	8%	12
Stanly	15%	33%	35%	12%	5%	17
Stokes	15%	33%	35%	16%	2%	15
Surry	15%	32%	42%	8%	3%	15
Swain	24%	39%	26%	6%	5%	3
Thomasville City	4%	35%	33%	16%	11%	3
Transylvania	13%	41%	29%	14%	3%	7
Tyrrell	24%	29%	36%	12%	0%	2
Union	12%	37%	28%	16%	7%	41
Vance	12%	32%	28%	20%	8%	12
Wake	15%	38%	31%	11%	5%	139
Warren	19%	36%	34%	9%	2%	5
Washington	21%	35%	27%	13%	4%	4
Watauga	19%	33%	31%	8%	9%	8
Wayne	16%	35%	31%	13%	6%	24

Weldon City	17%	37%	26%	10%	9%	3
Whiteville City	8%	26%	47%	18%	2%	3
Wilkes	13%	35%	37%	7%	7%	17
Wilson	13%	34%	37%	10%	6%	21
Yadkin	16%	37%	37%	6%	4%	11
Yancey	28%	20%	45%	4%	4%	8

APPENDIX C: INSTITUTIONAL REVIEW BOARD APPROVAL

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building · Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** · **www.ecu.edu/irb**

Notification of Initial Approval: Expedited

From: Social/Behavioral IRB
To: Bettie Smith
CC: Jim McDowelle
Date: 9/10/2013
Re: UMCIRB 13-001802
School Culture and Student Achievement

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 9/10/2013 to 9/9/2014. The research study is eligible for review under expedited category #5. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
BJSmithDissertationProposal8-19-13	Study Protocol or Grant Application
BJSmithPermissions	Dataset Use Approval/Permission

The Chairperson (or designee) does not have a potential for conflict of interest on this study.